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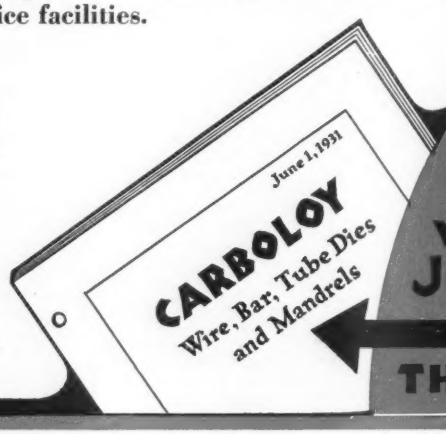

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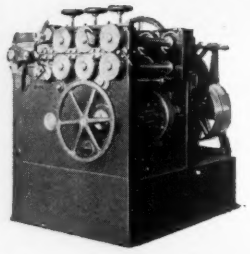

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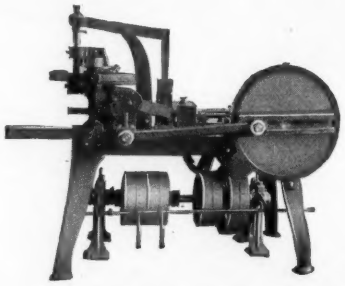

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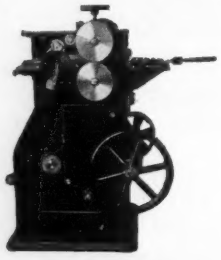

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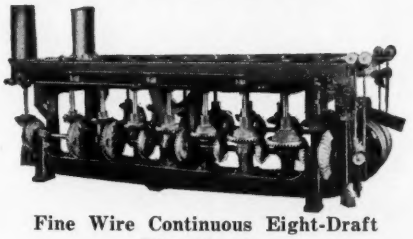

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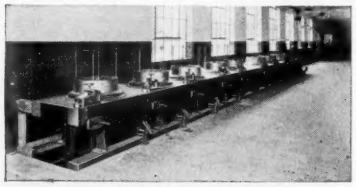

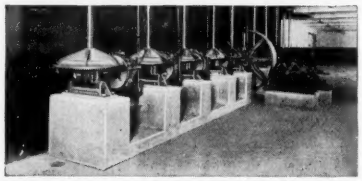

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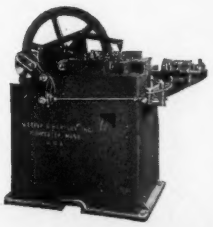

Wire Nail Machine No. 2

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A monthly publication devoted to the production of Wire, Rod and Strip. Wire Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING.

Vol. 6 October 1931 No. 10

Official Publication of The Wire Association

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R. E. Brown, Business Manager
Executive and Editorial Offices:
551 Fifth Avenue, New York City. Telephone: Murray Hill 2-10191

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DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 6 OCTOBER, 1931 No. 10

Lubrication and Application of Tungsten Carbide Dies

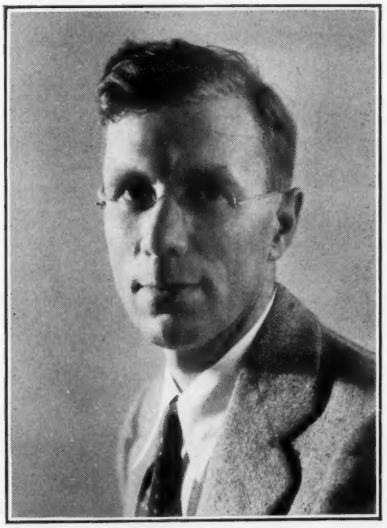
By C. R. Longwell,
Engineer, the Carboloy Company, Detroit, Mich.

A paper presented before the Wire Association describing lubrication methods in connection with the use of tungsten carbide dies. ▼ ▼ ▼ ▼ ▼

IT is necessary to exceed the elastic limit of the metal being drawn in order to cause the material to flow or elongate. This elongation is effected by using the principle of the wedge in reducing the diameter. The side thrust on the die, therefore, is considerably greater than the actual pull required to reduce or elongate the material. The pressure between the material and the die is practically the same as the elastic limit of the material being drawn. For instance, if we were drawing .08-.10 carbon steel wire with an elastic limit of 28,000 pounds per square inch the pressure between the material and the die which we would have to consider in working out a satisfactory lubricant would be 28,000 pounds per square inch. If we were considering copper, this pressure would be at least 18,000 pounds per square inch. It is true that the side thrust on the die is less than the amount indicated by the draw pull in proportion to Poisson's Ratio for the material being drawn. It may be just as well, however, not to consider the application of this raito at this time.

✦ ✦ ✦

THE problem of lubrication of wire drawing dies is at least comparable to that of the lubrication of bearings and gear teeth. Considerable advance has been made during the past years in lubricants used on bearings having a high unit pressure and on gear teeth having a high tooth pressure. The allowable bearing pressure and gear tooth pressure in pounds per square inch has increased as lubricants have become available which would stand up under these higher pressures. When high tooth pressure was first put into use there were many failures due to poor lubrication. It was found that practically all lubricants broke down at 5,000 to 6,000 pounds per square inch pressure and allowed seizure in the bearing or on the test pieces. Today, lubricants are available, which in test, have prevented seizures at pressures of approximately 40,000 pounds per square inch. These same lubricants have been tried in certain drawing mills with some success. It must be borne in mind, however, that in applying a lubricant to bearings or gear teeth, a clean lubricant is applied to a clean surface which is free from abrasives.



C. R. LONGWELL,
Engineer, The Carboloy Company
Member Wire Association.

✦ ✦ ✦

CONTRAST this progress with that which has been made in the wire drawing industry. Here high bearing pressure between the material being drawn and the die have always existed and here the lubricants which have been used over a long period of years have all been of a type which break down at a pressure considerably below that existing in the die. In addition,

we have noted in several mills running iron and steel wire, a cleaning method which allows the material to reach the die in a condition which is not conducive to long die life. The pickling, washing, rusting, and liming operations as conducted in these mills, bring the material to the wire drawing machines in a condition which is more or less abrasive. The rod ready for drawing was not free from black oxide which in itself is extremely abrasive. It is true that the red oxide or sull coat is something of a lubricant, and while various lubricants are applied in the die boxes of the average wire drawing machines, there is, in the majority of cases, little or no effort made to remove the metallic particles which come from the material being drawn and to keep these particles from passing through the die with the material. It is due to these facts that high die life is not obtained and it is easy to appreciate the fact that if the dies were actually lubricated to the point where the material being separated from the die by a film of lubricant, the die life would be greatly increased and the finish on the wire drawn would be much better.

In applying the results of the lubrication tests made with clean oil and clean test blocks to the actual conditions in a drawing mill, one must consider the condition of the material being drawn and remember that while the surface of the die is prepared so as to reduce the coefficient of friction to a minimum, we are using this surface to prepare the surface of the material being drawn; therefore, the results obtained from using lubricants which stand up to high pressure in bearings and in lubricating gear teeth are not always as good as hoped for. This is due to some extent to the fact that abrasives are continually being added to the materials in the die boxes. If you will visit practically any wire drawing mill, you will find that the methods used in applying lubricants to the wire drawing operation are practically the same as they have been for very many years.

Progress in Lubricants

SOME progress has been made however, in a few mills where a substance which adheres has been applied to the material being applied to the material being drawn, thus forming a definite drawing surface between the material being drawn and the die. One instance comes to mind of a mill using a graphite carried by a material which causes the graphite to adhere to the wire. The mixture is applied to the wire just ahead of the die and to date this is the only satisfactory means which has been found for economically drawing this material. The fact is that before this method of lubrication was worked out, it was barely possible to draw five or six feet of wire through a die before a break occurred, while greater lengths of wire were drawn through the dies when graphite lubrication was used. It is true that the graphite remains on the wire after drawing, and in many cases it is necessary to remove the graphite by a cleaning process. In this particular mill it has been found more economical to draw wire in longer lengths and to clean the wire after drawing, rather than to obtain only short lengths by using the die to clean the wire.

✦ ✦ ✦

IN many mills today the lubricant is applied at the ripping die and the wire is then drawn through three or four subsequent dies without any additional application of a lubricant. This allows a mill to obtain clean wire at the expense of the dies. This may be the most economical method of cleaning, but why would it not be possible to draw wire much more economically by actually lubricating the material being drawn and cleaning the wire in a cleaning process.

✦ ✦ ✦

Lubrication During Drawing

BY actually lubricating during the drawing operation much greater die life will be obtained. One mill that comes to mind where considerable thought and effort have been applied to this problem states that in drawing copper wire from the rod to .080, they obtain at least 4,000,000 pounds of wire through a tungsten carbide die nib while the nib is being used from .080 to the rod. Another mill drawing copper wire under practically the same conditions with the exception of the lubricant used, state that 250,000 pounds obtained from a die nib from .080 to the rod is very economical. These figures are mentioned simply to indicate the great variation in poundage obtained in different mills drawing the same material, and serve to illustrate that there is a large field for thought and effort in the problems of lubricating dies.

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Another illustration which is of interest in this connection was obtained in a steel tubing mill where we recently delivered an inch and an eighth die. The superintendent reported that the die was not right and that the tube obtained from the die was undersize. A careful investigation showed that by simply changing the lubricant which he was using, we were able to vary the size of the tube drawn from the size of the die to .008 under the die size.

✦ ✦ ✦

WE believe that a thorough study of lubricants and methods of lubrication will make it possible to greatly increase the die life and at the same time to decrease the conversion cost from rod to wire. We have done some work along these lines and the results to date are at least promising. The cooperation of the various mills in considering the question of lubricants and their application would, we feel, make it possible to better conditions within a reasonable length of time.

✦ ✦ ✦

Possibilities of Hot Drawing

IN considering the application of lubricants to the problems of drawing, we might well think of the possibilities of drawing our materials while hot. We now roll to quarter inch size and then in the majority of mills draw down to smaller sizes while the material

(*Please turn to page 411*)

Soap As A Lubricant

By R. T. Kline,
Lubrication Engineer, the J. T. Robertson Co., Syracuse, N. Y.

A paper presented before the Wire Association outlining specific requirements for satisfactory use of soap lubricants for wire drawing. ▼ ▼ ▼ ▼

LET me confess right at the start that I was somewhat startled to see myself indicated as an "Engineer" in the program. I really can't lay claim to any such title. If it means what I think it does I still have a lot of research and investigation ahead. However, words do not always have the same meaning to the same people as is proven by the old story of the time when Mark Anthony was rushing Cleopatra. When he called one evening and asked to see Cleopatra the slave said "I'm sorry Cleopatra can't see you, she's in bed with erysipelas!" And Mark was considerably het up and exclaimed—"What, that Greek still hanging around here!"

I'm not an Engineer—altho I have probably asked more questions, read more books and dug more generally into the subject than anyone else. Not that it has meant much—for the lack of written information about soap as a lubricant is to me an amazing thing. Really my chief source of information has been a lot of you fellows that are here today—and because you have more practical knowledge of the subject than I, I hesitated to even come before you with this subject. In fact I talked the matter over with a wire man and he seemed to think without actual mill experience I couldn't do the subject justice. Right there I suggested he do the job himself and I'm really sorry I couldn't sell him the idea. After some later discussion with Mr. Brown, it was decided that this effort would have a somewhat different objective. In other words, I would be in the same position as the Salvation Army matron who was approached by a drunk who said, "I understand that you save young girls here" and she said very sweetly, "Yes, that is our mission in life" and he said "That's fine, save me two for Saturday night."

MY mission is to tell you what little I know about it and each one of you in turn ask some questions, and tell some experiences so that all may benefit. So I will tell you what I have learned of interest about the use of soap as a lubricant and hope that you will all have questions or suggestions afterward. I think the discussion after these talks is the most valuable part of the sessions, anyhow. If I can't supply the answer, I'm pretty sure there's some one present that can.

History of Soap Lubricant

SOAP is probably the oldest known die and wire lubricant. History tells us that wire was an article of commerce as early as 1700 B. C. and inasmuch as the excavated ruins of Pompei show evidences of crude soap factories, and petrified soap molds and cakes, it is safe to assume that soap has from the beginning been closely associated with the production of wire. Our own wire practices were probably imported from England and Scotland.

Just how these old country mills started using soap is not recorded but my own idea is something like this. In the old countries, probably Scotland or England, before the days of soap factories it was the habit and custom for the housewife to save all the scraps and fats from the cooking and slaughtering and by boiling these with the wood ashes from the hearth, produce a soft soap. This was used not only as a cleansing agent for face, hands and body, and for the cooking utensils, but was used also to grease the crude wagon wheels and such other implements as had

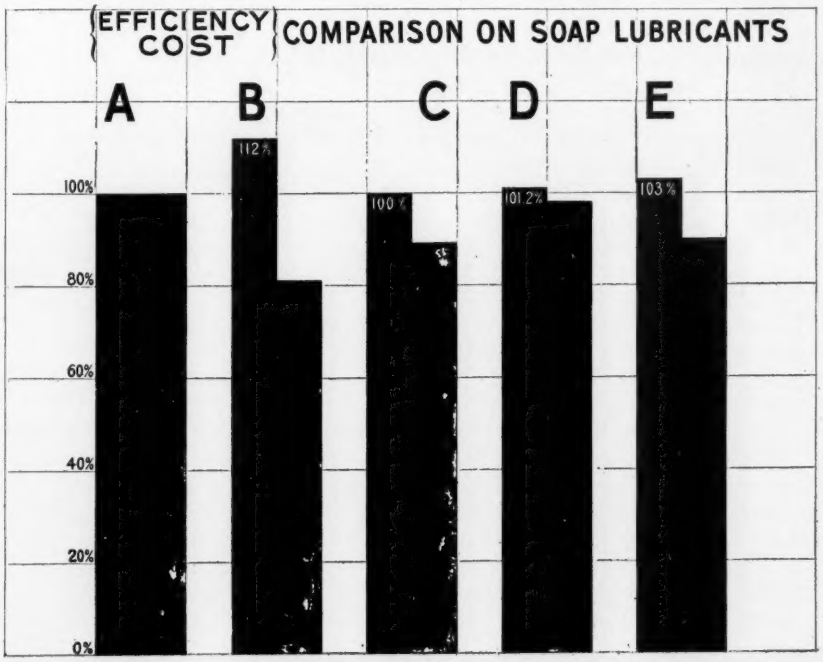

Chart showing results of comparative lubricant tests.

a tendency to squeak when in use. What more natural thing than for the boss of the wire mill to carry some of the household soap to the mill and apply to the dies. When the Pilgrims landed in this country they brought their soap making brass kettles with them and when wire drawing was introduced the use of soap was the natural order of the day. In fact some mills still use yellow laundry soap in drawing wire, especially in New England.

Soap As A Drawing Compound

SOAP is more universally used as a drawing compound because it is clean, easy to handle, concentrated, fool proof, has no waste, and is more easily adaptable to a wide variety of conditions.

The chief function of the lubricant is to lubricate the wire and the die, keep down the temperature of both; and coat the wire for further drawing.

Practically all of the animal fats and vegetable oils used in commercial soap making, can be used in making specialized soap products for wire drawing. The one exception is cocoanut oil.

Yellow grease, low grade tallow, and peanut oil are used in making a grade of soap powder suitable for low carbon stock.

High titre tallow and palm oil are used chiefly for powders to draw high carbon wires.

Olive oil and fish oils are usually indicated on wire rope stock and spring stock where frequent "patenting" is necessary and where flexibility is essential.

The most important factor in the selection of raw stock to be used in making these special lubricants as well as determining the selection of certain soaps for certain jobs is the titre, or melting point.

Titre

TITRE is a chemical term denoting melting point of the stock. Generally speaking there are two classes of wire drawing soaps; those for low carbon stocks—made usually from yellow grease, low grade tallow or peanut oil which has low titre; and those for high carbon wire—made from high grade tallow or palm oil having a high titre from 40 to 42 or 3. Low titre soaps are sometimes known as soft soaps because they break down more quickly, while high titre soap are hard soaps because they are heat resistive. Thus titre plays an important part.

Grind or Mesh of Powder

THE grind or mesh of the powder itself does not have any great bearing on its use. Some mills prefer a coarse powder, others a fine, while others want a mixture of the two.

Moisture Content

THE moisture content is, however, very important. You cannot draw wire with water that is, iron or steel wire, so it is essential that the soap powder be as free from moisture as it is possible to get it. 5% is the maximum and anything under this will be just that much more efficient. The amount to be used depends on the size of the wire, and the amount of reduction. The die box should always be filled with soap so that the wire runs through the soap.

This may sound silly—but I have been in plants where it was necessary for the operator to keep pushing the powder up around the wire, whereas if the box had been full so the wire was covered it would pick up its own lubricant without help.

Soap Per Ton of Drawn Wire

THE amount of soap used per ton of wire drawn varies from 1½ to 3 lbs., according to the grade of wire, size, allowance, etc. However, we will go more into these details later on.

Some of these materials are used in solution for wet drawing and some can be and are used just as they are produced by the renderer.

Soap Made In Drawing Machine

I BELIEVE you would be interested in the methods and materials used in drawing aluminum wire. Up in Massena, N. Y., at the Aluminum company's plant where they draw aluminum wire and make cable of all sizes, they actually make soap in the drawing machine. They use a good grade of tallow, put it in a small cooker, and partly saponify with caustic. The result is a thick liquid that is dumped into the drawing machine and pumped over the die. The wire runs at high speed and the heat from the die further saponifies the soap and the aluminum flakes from the wire, theoretically produces an aluminum soap. I understand they have tried about everything in the way of lubricants, including prepared soaps, but the partially saponified tallow seems to be the best for the purpose.

Aluminum Stearate For Bright Finish

THIS brings up the question of aluminum stearate and aluminum stearate soap. When the alloy dies were first introduced the manufacturers suggested special soap—tallow or palm oil combined with aluminum stearate. Several of these products were made up and worked satisfactorily in probably a dozen different mills. Reports indicated that a much higher finish was produced than with other lubricants. However these products were more expensive and after the new dies were in more general use it was found that the regular lubricants could be used just as satisfactorily with them. In view of this it has been our experience that special lubricants are not necessary. If brighter finish is desired on certain jobs aluminum stearate can be used by itself or mixed with the soap.

Probably there is no business in the country that has a wider diversity of standards, equipment and specifications than the wire industry. Even where two mills are drawing the same basic product, the equipment, pickling, tolerance, dies and conditions are apt to be entirely different. The personnel, too, have their own ideas, not only about lubricants, but other phases of the business as well so that one man's meat may be another's poison.

Differences In Practices

FOR instance, a year or so ago I was called into a mill in Jersey to supply a special lubricant for

drawing stainless steel. They were drawing rods and wire. For their regular production they were using grease, oil and soap. None of these would do for stainless steel. When I arrived they were drawing rods by smearing them with a mixture of red lead and oil. It was a messy job and everything besides the rods were well covered. We worked out a concoction of soap, red lead and graphite and also supplied some aluminum stearate soap. Neither would do the job. They were using cast dies taking quite a draft at medium speed. Then we checked the wire and found it was heavily coated and out of round. After fooling around for several days, it was found that by using alloy dies, a light draft and slowing down the speed a satisfactory job could be secured with the high titre soap that had been standard with them.

Shortly after that I was in a Worcester mill, and being interested, I asked about stainless steel and found that they were using low titre soap, a light draft and slow speed.

Just recently I was in an Ohio mill and discovered that they actually liked to run stainless steel because it worked so well. Here we have some figures—drawing stainless steel shapes—52 thousandths reduction—250 feet per minute with high titre soap—on 190 bundles—2 scratches—cut 5 bundles. The super was proud of this production and well he might be in view of the other experiences I have mentioned.

The wide variations in conditions are particularly noticeable as to speeds, amount of reduction and the kinds of dies, so that it is impractical, almost impossible for anyone to work out a schedule or chart that would be an infallible guide for drawing practice.

Selection of A Lubricant

THE composition and titre of the soap is still the prime factor in making recommendations. Another thing; conditions change in the mill with the requirements of the buyer or with the introduction of new methods or machinery. Oftimes these changes are so gradual as to be passed over as of no importance until trouble or some other agency brings them to notice. I recall a small specialty mill that had previously used soap but had switched to grease and oil claiming that it was impossible to draw his product to size with soap. He went along for several years, became interested in aluminum stearate soap in connection with his trial of the new alloy dies and now he is rapidly changing back to soap, because it is cleaner, gives a better finish and does the job.

Again because of the differences in conditions tests do not always prove conclusively that what is good for one is good for all—altho, if continued long enough they are interesting and enlightening and usually prove plenty to the mill running the test as you will presently see. I'll say one thing right here— you wire men are almost without exception friendly and willing to cooperate with manufacturers who may have something of interest for you. I can speak for all of us in the supply end—that I enjoy my contacts with you because you do not hold out on me, you give information and suggestions freely and such treatment is certainly appreciated. I know it is difficult for you to make tests, follow them through and keep records. Your main job is production and the other is incidental. However, we can only learn more about lubricants or discover new things, by tests. Along this line I want to tell you about an exhaustive test conducted by a mill about a year ago.

R. T. KLINE
Sales Engineer, The J. T. Robertson Co.
Member Wire Association

Comparative Test of Lubricants

FIRST this test was conducted entirely by the mill. I just happened to know about it and asked for the figures so I could present them to you.

It had two objects:—

1.—Determine comparative lubricating quality.

2.—Determine cost of lubricant per ton of wire drawn.

Stock: High carbon—manganese content.

Dies:—Chilled iron.

Conditions: In order to eliminate as much as possible varying conditions, stock from same patenting, cleaning and baking run on two sets of blocks, running at same speed and producing same size wire.

Number of soaps tested—5.

Number of reels used in test—1677.

Method of testing—Soap being used previous to test designated as "A" and performance of "A" figured as 100% as to cost and efficiency. Then "A" was run against "B"—"A" versus "C"—"A" to "D"—"A" to "E".

The comparison of the results as to quality consisted of grading the finishing end of each coil as smooth, average, rough or scratched. A wire was graded as SMOOTH if the micrometer could be set on the diameter of the wire and turned freely around the wire without feeling any variations in the diameter. An AVERAGE wire was one on which variations in diameter could be felt, but such variations not great enough to prevent the micrometer from being turned around the wire. A ROUGH wire was one on which the variations in diameter were great enough to prevent the micrometer from being turned around the wire approximately .0005″ to .002″. A SCRATCHED wire was one on which the variation in diameter was .002″ or greater.

The weight of the soap used in each case was kept so that the cost of lubricant per ton of wire drawn could be determined.

(*Please turn to page 414*)

ELECTRO-GALVANIZING

By L. D. Whitehead

Whitehead-Hill & Co., Ltd., Cwmbran, Mon. England

The third paper of a discussion on

HOT GALVANIZING VS. ELECTRO-GALVANIZING

between Mr. L. D. Whitehead of Whitehead, Hill & Co., Ltd.

and Mr. G. K. Rylands of Rylands Brothers, Ltd.

Mr. Whitehead again takes issue with Mr. Rylands' criticism on electro-galvanising.

HAVING been invited to reply to the criticisms of Mr. G. K. Rylands of my article in your publication on the merits of electro-galvanising, I wish, before reviewing his criticism, to remove from his mind any impression that we have made any unfair attack on hot-galvanising, including the Crapo process. If he will read my article again, he will see that I specifically mention the introduction of new processes to hot-galvanising from the U. S. A., which have brought about an improvement in the quality of that process, and I have confirmed this definitely in correspondence with his firm. Such comparisons as I have made are no more out of place than the claims of his firm for the merits of their Crapo process over those of other forms of hot-galvanising. Unless I had been genuinely convinced that I had something better to offer under our electro-galvanising process than anything that had been previously produced, my article would not have been written.

There is nothing extravagant in the claims I have made, as subsequent and more searching independent investigations instituted, not only by us, but also by the consumers of the highest-quality galvanised wire, fully confirm everything I have stated. I am a little surprised at the suggestion that I ought to have limited my article to a description of the plant. Surely this is only half the story, and it is just as important to possible users of the process and to consumers to be told something about the advantages of these new methods of production.

AFTER all, it is not unusual to find in new developments much the same opposition from those operating the older processes. The makers of wrought iron did not welcome the advent of steel, any more than the horse owners did that of railways or motor cars. This, of course, is only by way of illustration, and I do not suggest that electro-galvanising is a development of the same magnitude, although it is an important step in the right direction.

What was Attempted in Electro Galvanising

I am in no sense a "new broom," as I have been connected throughout my career with certain modern and successful developments in the iron and steel industry, such as continuous rolling. Having had placed in my hands what was then a practically derelict wire works, I had to make the best of it. The only attraction was a crude electro-galvanising plant, which produced results that were either very good or very bad. Yet I had firmly fixed in my mind that the ideal protection of wire against corrosion was a pure zinc coating, and that the only known means of obtaining this was by electro-deposition. I have already indicated in my first article the steps we took to develop this process on commercial and efficient lines and to make it "fool-proof." It took four and a half years to reach this stage, and we refrained from making any claims until we were certain we could substantiate them.

Before dealing with Mr. G. K. Rylands' criticisms, I wish to be allowed to express my appreciation of his courtesy in giving me certain information regarding the basis of his comments. Whilst we may differ in our views, we can do so in a spirit of the most friendly rivalry.

The first thing that must strike the careful observer in Mr. Rylands' investigations is that he ordered electro-galvanised wire *without specifying its quality*, and he places against this Crapo galvanised wire drawn from his stock at random. The whole value of his tests from a comparative point of view are, in the way they are set out, consequently rendered negligible from the start, as the comparisons he makes are not like with like, and I am afraid that, quite unintentionally, this has caused him to arrive at false conclusions.

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WITH a view of establishing a correct relationship between the figures he gives for the results of his copper-sulphate tests, sulphuric and hydrochloric acid stripping tests, and ascertainment of the weight of the zinc in the coating, I have, as a convenient method of comparison, reduced the figures he gives for Crapo wire to the basis of 1 or unity. Below, I give, in strict proportion, the average of his results for electro-galvanised wire:—

Gauge.	Copper-sulphate Test.	Stripping H_2SO_4.	Per cent zinc Tests on weight of HCl.	coated wire.
8	0.606	0.466	0.21	0.55
10	1.115	0.96	0.513	0.882
12	1.55	0.75	0.39	0.928
14	1.39	1.0	0.42	0.724

It will be observed, first, that in the copper-sulphate test the electro-galvanised wire gives substantially the best results, on his showing, in all cases except the 8-G. wire; but, if reference is made to the last column, showing the weight of zinc in the coating, and a proportionate allowance is made for the lesser thickness, the results are very substantially in favour of electro-galvanising in each case. If Mr. Rylands' figures are correct, then it definitely proves that a thinner coating by electro-deposition has a greater resistive value under the copper-sulphate test than the Crapo process.

Copper-Sulphate for the Stripping Tests

NOW let us examine Mr. Rylands' stripping tests. If these methods of testing are to be of any value, the results should approximately confirm those of the copper-sulphate test, instead of which they contradict it in the most amazing manner. Take, for instance, the 12-G. samples. Here we have electro-galvanising showing a superiority of 55 per cent over Crapo under the copper-sulphate test, and yet Crapo under the hydrochloric stripping test is 61 per cent better. The other results on each size also show enormous discrepancies.

Mr. Rylands, in his final conclusions, seems to favour the retention of the copper-sulphate test coupled with the introduction of the stripping tests; but by his own figures he shows that such methods of testing are most contradictory, and confirms the views I expressed in my first article on the unreliability of this method of testing, quite apart from its having no direct relationship with atmospheric conditions.

The Wrapping Test

WITH regard to Mr. Rylands' wrapping tests, I agree with him that this is essential, as all galvanised wire has in use to be bent more or less severely at some point or other, and that tests should comply with such conditions. In view of subsequent observations I have to make, it is important to note that, under this wrapping test, electro- galvanised wire satisfied him. At this point I may say that the inference made by Mr. Rylands that the Central Electricity Board call for a wrap on the wire on its own diameter is not correct, as their special specification—which is not included in the B.E.S.A. Specification 215/1930—is that the wire shall be wrapped on 2½ times its diameter, which is somewhat different.

---And a Challenge for the Hot Galvanizers

WE have since investigated Mr. Rylands' claim under this more drastic test in which he shows adverse results in the case of electro-galvanised wire when subsequently subjected to the copper-sulphate tests. After a considerable number of check tests, we find that electro-galvanised wire is in every case definitely better than Crapo, and no such poor results as he quotes for our electro-galvanised wire have been approached. We challenge Mr. Rylands' figure in this test, as his figures for hot-galvanised wire after this extremely drastic test give better or equal results in the copper-sulphate tests after unwrapping than when originally tested in the straight length. Such a claim is obviously the height of absurdity and cannot be substantiated. To remove any possible doubt on this point, I would readily agree to the submission of this or any other claim for the Crapo process to strictly independent official tests in comparison with our electro-ganvanised wire.

Micro-Photography

WITH regard to photo-micrography, I agree with Mr. Rylands that this is not a schoolboy's game, but require the most careful expert handling, and we have been most particular on this point. This form of investigation is useful from an illustrative point of view, but, unless properly understood, can lead to all sorts of false conclusions, as I will shortly show.

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TO start with, in the preparation of the samples of two metals in close conjunction, as in the case of a zinc coating and a steel base, where one has a soft metal and a hard metal, it is an extremely difficult and delicate operation to avoid a step between the two metals. Our subsequent investigations show also that there is a limitation to the magnification possible to secure a correct focus between the coating and the base metal. I am now advised, in consequence of this, that magnifications over 100 are not reliable, and I give you in fig. 1 typical examples at this magnification of (1) electro-galvanising, (2) Crapo hot-galvanising, (3) British ordinary hot-galvanising, and (4) Continental hot-galvanising, which clearly show up the actual line of demarcation between the coating and the base metal, and at the same time they give a fair illustration of the nature of the coatings.

In examining these, one observes in the case of electro-galvanising there is an absolutely uniform coating of pure zinc throughout and a penetrating bond with the base metal which Mr. Rylands' photographs do not show up owing to their being out of focus.

In the Crapo samples, which, I agree, are the best I have so far examined of the hot-galvanising process, the outer coating is of semi-pure zinc, but the inner part is, as Mr. Rylands agrees, zinc-iron. In this case the bond of the base metal does not seem to be so deeply penetrating as it is in the case of electro-galvanised wire.

In the sample of British hot-galvanised wire the results are not as favourable as Crapo, as the outer coating of semi-pure zinc is not nearly so thick, and the brittle zinc-iron alloy comes much nearer to the surface. In the case of the Continental galvanised wire, not only is the coating very thin, but there is a serious contamination of zinc-iron right up to the surface.

THE first false conclusion which Mr. Rylands comes to in examining these photo-micrographs of electro-galvanised wire is that there is a layer of zinc oxide not only between the coating and the base metal, but also between the laminations. Such a suggestion is obviously wrong, as our process of electro-deposition completely prevents such an impurity being formed, and further than this, the presence of this impurity would render electro-deposition practically impossible. His own tests confirm this, as under no conceivable circumstance could galvanising this is a definite part of the process, and instead of detracting them from its corrosion-resisting qualities, it adds materially to them. Let me give a simple illustration of what this means—it is well known in painting that three thin coats are of far greater protective value than one thick coat. In our process the wire receives from 15 to 20 coatings. In etching the samples it is impossible to separate each of these closely uniting coatings in the process of the polishing of the samples, as some of these merge and give the appearance of the broad bands of unknown in the best-regulated steelworks. I cannot, however, resist suggesting to him that the virtue in hiding a flaw in the steel under his Crapo galvanising is less in the consumer's interest than is its easier detection under our process.

Now I will refer to figs. 4 and 5, showing the cross sections of hot and electro-galvanised wire. Here Mr. Rylands has gone to the opposite extreme and used such low magnifications in his photographs, after allowing for the side-light effects, as to render them almost meaningless. Neither the hot- nor

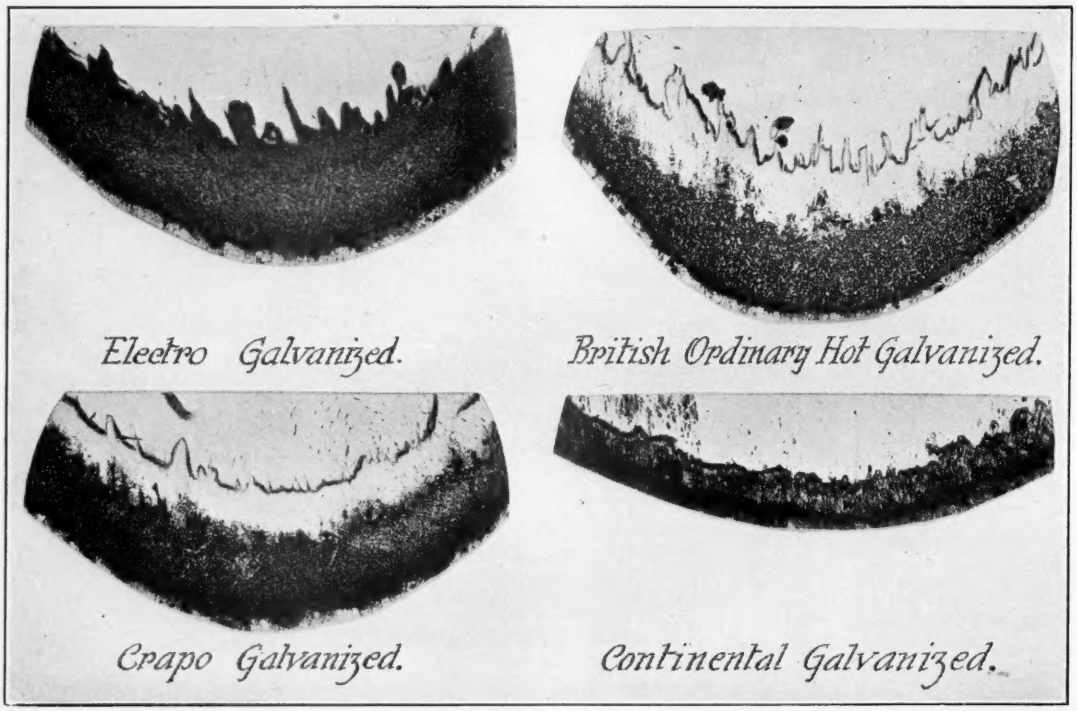

Fig. 1.—Various Galvanised Coatings Magnified 100 Diameters on Obliquely-cut Samples.

with such inclusion of zinc oxide have withstood his drastic wrapping tests without peeling, and these, he agrees, were satisfactory.

I do not think Mr. Rylands is quite fair in jumping to the conclusion that the blurred effect at the junction of the coating and the base metal, due to the photograph being out of focus, is zinc-oxide. He apparently made no attempt to identify this compound at this point, or its presence, as he further suggests, between the laminations. With regard to the laminations or striations, which Mr. Rylands specially criticises, lighter shade he shows. The whole structure of the coating is, however, pure zinc.

I cannot help being amused at his illustration in fig. 9 of a surface flaw in the steel, as, if the flawn shown in the 12-gauge Crapo wire in fig. 6 is reproduced to the same scale, there is very little difference in their respective magnitudes. In any case, I do not propose, in this discussion, to introduce the broader and quite irrelevant subject of the quality of the steel, beyond saying that I do not presume Mr. Rylands claims for Partington or any other steel an immunity from defects which is

the electro-galvanising process would be "hanged" on evidence of this description. Here Mr. Rylands has allowed photo-micrography to become his master, and consequently he once more draws wrong conclusions. It is a simple matter to prove this, as it is only necessary to take a sample of our electro-galvanised wire and submit it to the copper-sulphate test, when it will be invariably found that the final failure comes with a dramatic suddenness all round its circumference, thus showing the true concentricity of this form of coating. On the other hand, in hot-galvanising wire this rarely, if

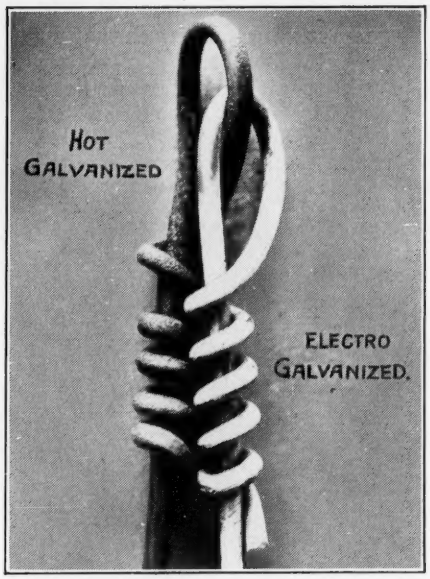

Fig. 2.—Fencing Wire after 3½ Years' Exposure.

ever, happens, and the failure takes place in patches, thus showing an unevenness in the thickness of the coating.

Under our process, not only is the concentricity of the coating truly maintained, but its thickness, whatever the quantity produced, can be controlled within far narrower limits than is possible under the hot process, and this is important from every point of view.

With regard to Mr. Rylands' suggestion that our coating is "non-crystalline," he evidently credits us with having discovered an amorphous form of zinc. I can, however, assure your readers that our zinc coating is a crystalline metal, and not changed by reason of electro-deposition.

Colour of Wire

NOW to deal with Mr. Rylands' twice-repeated criticism of the colour of electro-galvanising. The bright sheen shown on hot-galvanising can be obtained just as easily in the worst qualities as in the best, and is, therefore, no criterion of quality in this respect. We prefer our distinctive colour so as to enable customers to know what they are buying. As issued from the factory, the hot process is brighter in colour, but what is the ultimate object of galvanising? Is it for appearances, or is it for protection against corrosion? We are working on the latter assumption.

What happens a year or two later in actual use? Electro-galvanised wire brightens during exposure and continues so up to the end of its life, whereas hot-galvanised wire rapidly becomes a dull grey to a black.

In proof of this I cannot do better than show you, in fig. 2 an example of electro-galvanised wire and British hot-galvanised wire, both used in a fence erected by the Monmouthshire County Council on an exposed mountain side three and a half years ago. Under these severe conditions it will be seen that the electro-galvanised wire has not only kept its coating, but is quite bright, whereas the galvanising under the hot process has disappeared, and there are evident signs of rapid deterioration of the base metal.

Whilst I regard our method of galvanising of greater importance in the higher grades of galvanised wire, I do invite those interested in the best class of fence wire to test this claim by mixing, as in the case I have cited, electro-galvanised with hot-galvanised wire, and this will soon prove the correctness of our claims. With regard to electro-potential tests, I know opinions vary on this method, and I do not wish to stress it, as we have stronger grounds on which to base our claims, but at the same time it confirms our investigations in other directions.

My concluding comment in reference to Mr. Rylands' criticisms is to refer him to a statement in one of his firm's recent advertisements, in which it is said that "pure zinc has long been recognised as the best protection for iron and steel against corrosion . . . a full and uniform layer of pure zinc, thus ensuring maximum protection." This is exactly what I have claimed, and the only means of attaining such a quality is by electro-deposition.

Regarding These Tests

WITH regard to our own tests, these have been in two series, the first of which were conducted by our consulting chemists, G. Rudd Thompson & Partners, who have a wide experience in metallurgical research work. Their investigations embraced exhaustive chemical analysis, photo-micrography, copper-sulphate tests on wire after various degrees of bending; acid stripping, salt spray and exposure tests. All these tests were conducted on samples, which were ordered from four of the leading makers in this country, of hot-galvanised wire to a definite specification requiring four one-minute dips in copper-sulphate, and were compared with our electro-galvanised wire to a similar specification. These investigations were of four years' duration, and were conducted with the greatest care, so as to enable us to learn the true best or true worst of the process and thus enable us to decide as to whether it was possible to develop it on commercial lines.

A great deal of valuable information was got together, and this has largely contributed to the successful accomplishment of our object. My first article, in your issue of January 25, was based on this data. I then decided that it was desirable to subject our claims to independent investigation, and I therefore placed the matter in the hands of Mr. T. Henry Turner, M.Sc., who was then Lecturer on Metallurgy at the University of Birmingham, and who has since been appointed chief chemist and metallurgist of the L. & N. E. Railway.

T. Henry Turner Retained as Expert

THUS began the second series of investigations. Mr. Turner first carefully studied our process. He then ordered on the open market samples of our galvanised wire and of three leading British makers to the standard specification, and also a sample of Continental galvanised wire. He was instructed, if possible to devise some form of test which would be more reliable and relevant than that of copper-sul-

phate. He first examined the data obtained from our earlier investigations, with results which confirmed our findings, except that he came to the conclusion that there were no means of chemical analysis on which he could rely, as the coatings of the hot-galvanised wire were not homogeneous, and chemical analysis could only average up such variations and so give false results.

To meet this he suggested spectrum analysis more truly to determine the nature of the coating. To assist him in this form of research he was fortunate to have the help of Mr. D. M. Smith, A.R.C.S., B.Sc., M.Inst.Metals, of the University of Birmingham, and the spectroscopist to the British Non-Ferrous Metals Research Association. Mr. Smith has done valuable research work in this particular line of investigation, and only as recently as last December he submitted to the Faraday Society a paper on *The Spectrographic Determination of Cadmium, Lead and Iron in Zinc,* which was recently published. It would be an interesting sequel to this discussion if he were to contribute a further paper dealing with the still more important point of the behaviour of zinc when applied as a protective coating to metals.

Method Followed in Conducting Tests

THE method adopted by Mr. Smith was to photograph by means of the Hilger small quartz spectrographic (E 37 size) the condensed spark discharge between two surfaces of each sample of wire. The method of preparing the samples was in accordance with recognised practice. Precautions were taken to ensure that each test was carried out under identical conditions. The exposures were of thirty seconds' duration, and the number of the exposures was extended so as to obtain an analysis of the coating in six separate stages. In all cases the coating was penetrated before reaching the sixth stage, and so the examination is a reliable record of the nature of the coating between the surface and the base metal. If it were only possible I should like to include examples of these spectrographs in this article, but they are too delicate to do any justice to, even on the best art paper.

Results of Tests

THE results of these tests are in the following ascending order of merit:—

Continental.—The first spectrum shows a fairly high iron content and a rapid lessening of the zinc content. The coating was penetrated at the second spectrum.

Two samples of British Ordinary Hot-Galvanising.—Many iron lines appear in the first spectrum; they increased in the second, and penetration takes place in the third.

Crapo Galvanising.—The first spectrum shows practically pure zinc. Iron lines appear in the second, they increase rapidly in the third, and penetration takes place in the fourth.

Electro-Galvanising.—The zinc lines persist to the last spectrum, and the first two spectra denote zinc of high purity. Faint lines of iron appear in the third spectrum, and penetration takes place between the fourth and fifth spectra.

The conclusions from these tests are that the coating on electro-galvanised wire is the purest, and whilst the outer coating of Crapo is approximately of the same purity, this purity does not extend so far from the surface.

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IN dealing with a complex problem like this the spectrum analysis gives very much more definite and accurate results than possible by chemical analysis. The lines of iron, lead, cadmium, magnesium, calcium, etc., always appear at one definite point in the spectrograph, and so can be readily identified. This can be accurately checked by comparing the spectrum with that taken of any one of the chemically pure elements I have mentioned. There is data on which the actual quantities can be fairly closely assessed.

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OWING to the importance of these investigations, Mr. Smith decided to check his results by an entirely different means. It is well known in research circles that pure zinc volatilises more rapidly than a zinc containing iron or other impurities. This is known as "The loss of weight test." The samples were submitted to six five-minute exposures to the electric spark, and after each exposure were weighed. During the first 30 seconds of each exposure the spectra referred to in the first test were taken, and so these two totally different lines of investigation were carried on simultaneously, and were an accurate and true testing of like with like. This "Loss of weight test" is a delicate one, in so far as it requires an unusual degree of accuracy and experience in weighing. In this respect Mr. Smith had the assistance of Mr. Kenworthy, A. R. C. S., B. Sc., who is one of the leading experts in this branch of research work. The graph given in fig. 3 is the result of this test.

Tests Demonstrate Superiority of Electro-Galvanizing

IT will be observed that electro-galvanizing leads with a considerable margin, and is followed by Crapo, after which come two samples of ordinary British hot-galvanising, and Continental galvanising comes as a bad last.

The fundamental object of these investigations is to establish the proportion of iron in the zinc coating. The presence of cadmium and lead is no disadvantage, and the small quantities of magnesium and calcium make little difference in the corrosion-resisting qualities of the coating.

The reason why the presence of iron is of such vital consequence is that its effect in a zinc-iron alloy is to cause brittleness, and this is the real origin of the trouble which arises in peeling or flaking when galvanised wire is bent. The Crapo process has reduced this defect, inasmuch as the outer coating is of a semi-pure zinc, which retains its ductility and is not liable to crack when bent. The danger however, lies in the sub-base of the Crapo coating, which Mr. Rylands agrees is zinc-iron, and consequently, when the outer coating disappears, the resistance

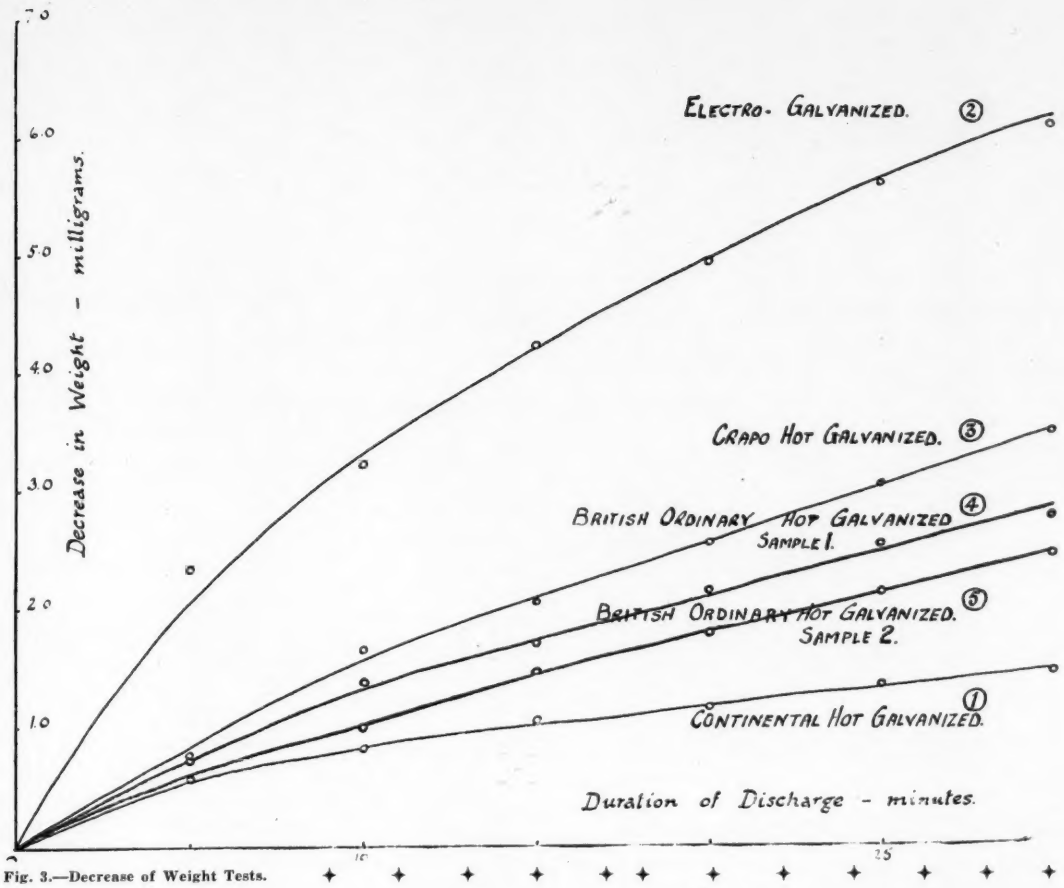


Fig. 3.—Decrease of Weight Tests.

to corrosion is lessened by the liability to minute fractures in the sub-base. In electro-galvanising this risk is entirely removed, as the coating is throughout pure zinc in its most ductile form, owing to its laminated structure.

We now come to the point as to what is the practical means of testing galvanised coatings so as to determine their true value, a point which is of the most vital interest to consumers, especially in the higher grades. In the circumstances, I suggest tests along the following lines:—

(1) General Inspection Tests

(a) That the wire to be tested shall be wrapped round a mandrel two and a half times its diameter without any signs of cracking or peeling.

(b) That it shall be capable of standing up under these conditions to the following dip tests in copper-sulphate (Preece tect).

Note.—The duration of these tests to be decided after official investigation.

(2) Laboratory Tests

(a) That the purity of the coating shall be ascertained by means of spectrum analysis. That a series of consecutive spectrographs shall be taken of each cample. The duration and number of which shall be determined so as to give definite and reliable readings.

That in the first two spectra no clearly defined lines of iron shall appear.

(b) That, alternatively, where sufficiently accurate means of weighing are available, that the "Loss of weight tests" may be submitted for spectrum analysis.

This forms the broad outlines of a specification which will give more reliable information as to the true value of a galvanised coating of wire.

I have purposely refrained from filling in the details, as this can only be properly decided after official investigation.

Under such a specification, firstly, we are able to test the bond between the coating and the base metal; secondly, we determine the thickness of the coating in copper-sulphate; thirdly, as to whether the base of the coating is sound and free from fractures; and fourthly, in more important work the foregoing tests can be supplemented by laboratory tests. Such a specification makes the methods of conducting general inspection tests practically as convenient as the existing specification, but very much more reliable in their results.

IN conclusion, I may say I have consulted some of the best-known authorities on the subject, not only in this country but abroad, and the consensus of opinion is very much in favour of the views I have expressed. These views are further confirmed by the favourable finding in every case where we have submitted samples for investigation by consumers of the highest grades of galvanised wire.

Lead Covered Cable

Types and uses of lead cable as compiled by the Lead Association.

THE growth in the application of lead to the fabrication of electrical cable has been little short of phenomenal. Fifty years ago consumption of lead in the manufacture of lead-covered cable was negligible, whereas nowadays 200,000 tons of lead are used annually for the purpose, equivalent to about 28 per cent of the domestic mine production, and the cable industry is still growing by leaps and bounds. As recently as 1921, the lead used in cable construction was at an annual rate of only 70,000 tons. It is estimated that more than 30,000 miles of lead covered cable are now made yearly in the United States, enough to wrap more than once around the earth, all of it performing a salient role in the distribution of electrical energy.

Cables Using Lead Covering

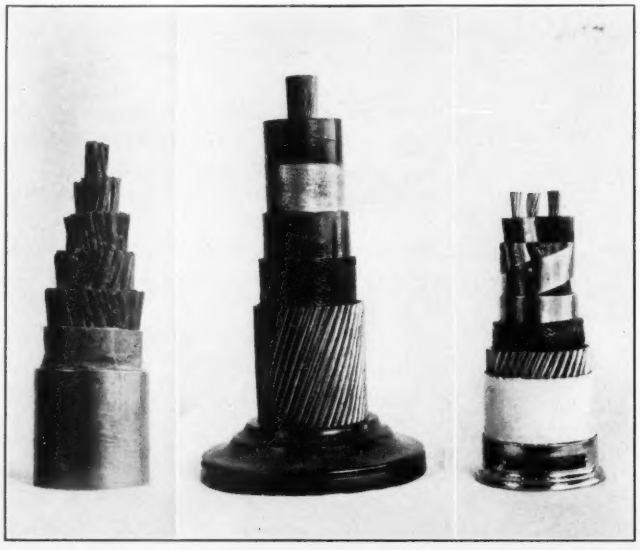
Lead is used in the construction of two general types of electrical cables, i. e., cable for voice transmission over telephone lines (low voltages) and cable for the transmission of electric power delivered by public utility generating stations (high voltages). A peculiar feature of both the telephone business and industries selling electric power is the fact that these great industries may, and do, predict accurately the future demand for their services. Telephone companies attempt to forecast telephone demand as much as 15 to 25 years ahead and in the planning of future equipment lead enters the calculations. Public utility companies likewise must anticipate population growth and its prospective effect upon electrical output and distribution.

LEAD-COVERED cables are used both in overhead and underground line construction but the modern trend in the practice of telephone and public utility companies is, in spite of higher first cost, to bury current carrying wires in the ground where they will be undisturbed and out of the way. Overhead wire systems are expensive to maintain because they are at the mercy of the elements—wind, snow, rain and ice—and are subject to mechanical injury. Exposed high tension cables are also dangerous, and in congested cities overhead wire systems are unsightly.

Underground cable must be protected from moisture of the soil or its insulation quickly deteriorates, with consequent short circuiting and interruption to service. Even overhead telephone cable, with myriad small wires insulated from each other, must be similarly protected. Therefore, underground and exposed overhead cables are commonly lead sheathed.

Cable Sheath Metal

CABLE sheath metal must be pliable so it will not interfere with the easy unreeling of the cable. Moreover it must have a melting point low enough not to damage the insulating material of the cable—in telephone lines, paper—when the sheathing is being formed. When in use the sheath must withstand corrosion and failure from fatigue and tensile stresses. Lead, and certain of its alloys, meet these requirements excellently. A tensile strength of about 4000 lb. per sq. in. is desirable in cable sheath lead.



Three types of lead-covered cable. They are (from left to right) telephone cable, armored single conductor power cable, and armored three-conductor power cable. ✦ ✦ ✦ ✦

Ideas which seem grotesque to us now permeated the minds of the first lead-covered cable makers. For example, one cable was constructed of 20 bare wires each drawn into small glass tubes and then pulled through a lead sheath and a mixture of oil and rosin added under pressure. When the lead pipe was bent the glass broke but the wires were said to have been kept apart by the resulting glass compound.

Pure lead was used to make the first cable sheathing and is still principally employed for power cables. Early lead sheaths contained about 3 per cent of tin to strengthen the lead. In 1907 experimental research was undertaken to discover an alloy which would satisfactorily replace expensive tin. After much experimentation with lead alloys containing antimony, tin, copper, nickel and bismuth, an alloy was evolved about five years later containing 1 per cent antimony which has been used extensively ever since. Power cable, having a stiff core, does not need the additional strength imparted by antimony so that antimonial lead is rarely used for power cable, but is generally preferred for telephone cable.

A recently developed lead-calcium alloy containing 0.03-0.04 per cent of calcium cooled from an extrusion temperature of 225-250° C, is reported to make a superior cable sheathing. In England alloys of 98.25 per cent lead, 1.5 per cent tin and 0.25 per cent cadmium, or 99.25 lead, 0.5 antimony and 0.25 cadmium have been developed for the same purpose. For submarine cable and cable that is to be buried directly in the ground, instead of conduits, the lead sheath is wrapped with tar-impregnated jute roving. In addition submarine cable is wrapped with galvanized steel wire. Cable to be buried in the ground is wrapped with steel tape. These are usually, but not always finished off with another layer of jute yarn impregnated with an asphalt compound.

Telephone Cables

Present telephone cable consists of a maximum of 1818 pairs of 26

Installing power cable under city streets.

A. W. gauge wire enclosed in a 2⅜ in. inside and 2⅝ in. outside diameter sheath. This is the size of sheath which has been found desirable in duct work, and the problem has been to increase the number of wires that the sheath may hold. The progress that has been made is shown by the fact that the number of pairs of wires has increased from 50 in 1888 to 1818 to 1930, with the possibility of 2400 in the future. As these wires are first wrapped with paper insulation, improvement in both paper and insulating machines has made it possible to use thinner paper, thus economizing on space. The insulated wires are twisted into pairs which are stranded into groups of 101 pairs and these strands into a compact core.

In the early days the core of wires was pulled into a lead sheath which had already been made, but it was soon found possible to extrude the sheath directly around the core. The principle is the same as that used in the manufacture of lead pipe, except that the fixed mandrel or core which makes the hole in the pipe is replaced by a hollow mandrel through which the cable core passes moving with the lead. Molten lead is placed in a chamber of a hydraulic press and cooled under pressure to the proper temperature for extrusion. When power is applied the lead is extruded through the die and carries the cable along with it. As the filling of the lead chamber and cooling requires more than half the time of operation, the tendency has been toward presses with larger lead containers, which has materially increased the speed of the operation. The pressure on the lead is about 54,000 pounds per square inch. Constant study of temperatures, speed of extrusion and contour of the extrusion chamber have lead to marked refinements in the quality of the product.

The completed cable wound on reels, a familiar sight to everyone, is flexible enough to be conveniently handled when it goes into place. Splicing together of lengths is accomplished by the use of two other lead products, a lead sleeve and solder. The joints are wiped with solder forming the well-known strong and durable plumber's joint.

THE first long distance lead-sheathed cables in the United States were placed in service in 1906 between New York and Philadelphia and between Chicago and Milwaukee. Each was about 93 miles long. In 1914 an underground toll cable was completed between Boston, New York, Philadelphia and Washingtlon, a distance of 453 miles. In 1925 the New York-Chicago line was completed and a year later extended to St. Louis.

It is expected that during the next four years toll cable lines will span the continent and extend the full length of the Atlantic and Pacific Coasts. Conversations from New York to San Francisco via Salt Lake City; San Diego to Spokane via Seattle; Chicago to Galveston via Joplin and New York to Jacksonville, Fla., completely over toll cable lines will soon be a reality. Even though the development of toll cable lines has been most intensive in the more thickly populated northeastern United States, on some of the established routes the growth of phone traffic is rapid enough to require additional cables at intervals of one or two years.

In the late summer of 1930, a 415 mile cable was opened between Los Angeles and San Francisco. An interesting feature of this line is that 43 miles of it are filled with nitrogen gas under pressure and the cable is divided at intervals by gas proof dams. Should the cable sheath be injured, the gas pressure drops in that particular section, sounding an alarm which locates the trouble approximately and allows "trouble shooters" to make repairs before any serious damage occurs.

The contrast between the capacity of the familiar telephone pole containing several cross arms and the modern toll cable line is particularly striking. A typical open wire line carrying four fully equipped ten pin cross arms, or 40 pins, provides what is known as 20 physical telephone circuits and ten phantom circuits, a total of 30 voice frequency talking circuits. Toll cable construction furnishes at one time a number of circuits equivalent to 7 or 8 open wire lines. A cross sectional area of less than 6 sq. in. can carry 100 to 300 voice frequency currents.

Power Cable

POWER cable does not contain so many wires as telephone cable. For transmitting alternating current at moderately high voltages up to, say, 33,000 v. lead sheathed cable containing three stranded copper conductors is frequently used. For higher voltages it is customary to employ several lead covered cables each containing a single stranded copper conductor. When only one stranded conductor is used in a cable the finished core is heavily insulated from the surrounding sheath. If more than one conductor is used in a single sheath as in the common 3 core cable, the conductors must be insulated from each other. Each conductor is frequently of an elliptical or segmental shape to fit better inside the lead sheath. Where high voltages are used the insulation must be wrapped with copper or aluminum tape to eliminate a corona effect. Although a patented process, all manufacturers of paper insulated cable are licensed to use it. This tape is, in turn, surrounded by a lead sheath.

Power cables are of many sizes and kinds. They vary from small lead-sheathed wires for the operation of signals or for use on ships, to 3- or 4-in. diameter cables containing a single conductor for high tension transmission. Recently insulated cables using aluminum instead of copper conductors have been developed.

Voltages

THE highest commercial voltage transmitted today through underground power lines is 132,000 v. over a 12 mi. line in New York City from Hell Gate to Dunwoodie, which is now being duplicated, and a six mile and two one-mile lines in Chicago. The cable contains a hollow conductor filled with oil and connected at intervals to oil reservoirs. The oil eliminates voids of air spaces in the cable which decrease its efficiency at high voltages. Other cities contain underground lines which also operate at high voltages. Cleveland has one at 66,000 v. over six years old. Underground cables will soon be able to handle anything that bare overhead wires do. The insulation in these cables is usually oil-impregnated paper.

Lengths

CABLE is made in varying lengths, usually being cut at the factory for the utility companies into lengths that will just reach from one manhole to the next. However, because of the manner in which lead sheath is extruded it can be made in unbroken sections of great length if desired.

*From Facts About Lead by permission of the Lead Association.

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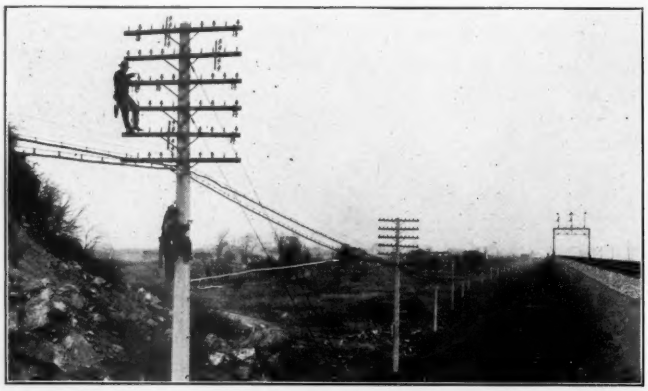
The Next Article in The Discussion Electro Galvanizing vs. Hot Galvanizing Will Appear in the November Issue of Wire and Wire Products.



Lead-covered telephone cables carry many more talking circuits than open wires in much less space.

The World's Largest Submarine Cable

By C. W. Geiger
San Francisco, Calif.

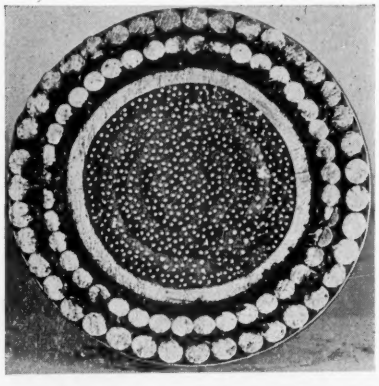
A condensed description of what is believed to be the largest submarine telephone cable ever made.

WHAT is believed to be the largest submarine telephone cable ever made has been installed across the Golden Gate, the entrance to San Francisco Bay from the Pacific Ocean.

The cable was constructed especially for this location it being built specially strong to withstand the pressure of severe tides which sweep in and out of San Francisco Bay, through the Golden Gate. Its special feature is a double layer of steel wire armor to protect it against the heavy tides that offer a constant challenge as they surge in and out of the Golden Gate. It is probably the last underwater cable that will be placed on this route between San Francisco and the northwest since the proposed Golden Gate bridge may carry future lines.

Construction of the Cable

The new cable's 300 pairs of 19-gauge copper wires, each insulated with double thickness of paper, is sheathed in 3/16 inches of lead. Around the sheath is a layer of water-proofed jute 1/8 inch through. Surrounding this is the first row of ¼ inch steel wire armor. Another layer of jute follows and then a second 5/16 inch row of steel wire.



Cross-Section. Three hundred pairs of paper-insulated 19-gauge copper wires shown in the center are protected by a double thickness of paper and a 3/16 inch lead sheath, surrounded by two 1/8 inch thicknesses of jute and two rows of steel wire armor, 1/4 and 5/16 inches thick, respectively. ✦ ✦ ✦ ✦ ✦

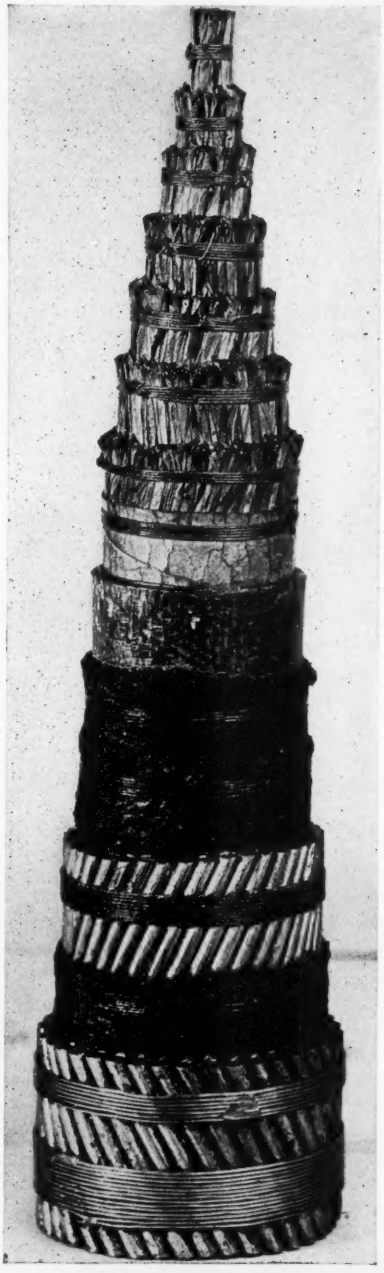
The outside diameter of the cable is 4-⅛ inches and the weight is 27 pounds 5 ounces per foot. From shore to shore the line measures 12,000 feet, and the total weight is over 160 tons. The total cost was about $50,000. Splicing was especially difficult on account of the double layers of jute and steel wire, but was accomplished skilfully by the Division Construction Superintendent and his crew on the Cable barge of the Pacific Telephone and Telegraph Company.

Trouble Shooting

THE laying of the cable recalls early days of "trouble shooting" on the Golden Gate route. In the 80's a single line in the Western Union's trans-Gate telegraph Cable was leased and used for telephone purposes. Leaving Marine County's shore the line ran up into Northern California as far as Santa Rosa. The single circuit from San Francisco's main office ran out through the Presedio, or military reservation to the water's edge.

Presedio target practice one day demolished several feet of the telephone line, and the young repairman (George Van Buren, who is still with the Telephone Company in San Francisco) found a piece of wire which he believed to be dead line belonging to the Army. Considering himself lucky to find the wire, he used a part of it to repair his own line—and the next day at target practice the Army officers

(*Please turn to page 416*)



Sectional View. The cable weighs 27 pounds and 5 ounces per foot. This cable was built especially strong to withstand the pressure of severe tides which sweep in and out of San Francisco Bay, through the Golden Gate. ✦ ✦ ✦

'Round the World With the Wire Industry

French Iron and Steel Situation

THE French iron and steel situation continues unimproved, and the exports are falling off. Production, although greatly reduced, still exceeds actual needs, and the volume of orders on the books is diminishing. Some rolling mills of secondary order are contemplating closing unless a change for the better occurs soon. The steel mills are reported to have only 15 to 25 days of work ahead, which will be still further reduced unless there is some stimulation of the market. Negotiations relative to the reconstitution of the European Steel Cartel are encountering difficulties, principally over the question of the basic period on which to fix export quotas.

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German Notes

THE German wire cartel has under consideration the appointment of sworn surveyors at Hamberg, Breman, Rotterdam and Antwerp, which for a moderate fee would inspect all German export consignments at the time of embarkation and issue a certificate, which would be sent to the buyers and could substantially reduce the number of disputes, which are especially frequent in all markets of Asia and Africa.

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THE German wire industry reports, that in future regular shipments will take place from Rotterdam, Antwerp to Chicago, Detroit, Buffalo and other Lake Ports in smaller vessels. The freight rate is 4.50—4.80, this added to present price for barbed wire of £42.25 brings the total to approx £47.— cif Lake Ports, or approx 15% below the American price for barbed wire, as no import duty has to be paid. For other products however such shipments will not pay.

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AFTER 2-3 years of great dullness the German music wire industry has again been able to book some business from the U. S. A. as the price difference between American and German music wires is at present very great, up to 35%. The average price of music wire, recently sold to the U. S. A. has been £130 per ton.

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THE export business in wire rods to the Canadian West (British Columbia) has been divided between the principal Belgian works in such a way that 66 2/3% will be supplied by Belgium and 33⅓% by Germany. British Columbia imports approx 6000 tons annually from both countries, as the freight rates from Antwerp, Rotterdam are only £4.—per ton and from the East Coast of Canada £7.—per ton.

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THE German makers of varnished wire report that orders from South America, which in the years after the Armistice used to be very heavy are sharply going back, as the consumers are not wanting this sort of wire anymore. American exports of varnished wire to the Argentine have also been stopped almost completely.

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THE German Reichspost (Government post) has laid last year 700 Kilometers of high tension aluminium wire, replacing copper wire. Most of the aluminium wire is the wall known Aldrey alloy a German/Swiss product, which is excellent by the high conductivity. The sharp reduction of the copper price may restrict laying of aluminum alloy wires, if the aluminium cartel will not reduce its prices.

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THE prices for wire netting are being further reduced in the last week in August and wire netting, hexagonal, galvanized after make, has been actually sold at 89% discount off the British standard list fob. and a few orders have been also taken from America, recently also square wire netting of G 9-11 wire, has been shipped to the U. S. A., in previous years no such orders have been executed.

Belgian Nail and Wire Sales Organized

AFTER very protracted negotiations, the Belgian nail and wire manufacturers have at last agreed to the establishment of a sales organization for the domestic market for a period of five years. Prices have not been altered for the present. The export agreement between Belgian and German works, which terminated on July 15, has been renewed for another year, and prices have been raised on the average by 60 cents per ton, except for barbed wire, which remains unchanged at $42.50. The way is now clear for an international entente between the nail and wire producers of France, Germany, Holland, Belgium, Denmark, Czechoslovakia, and the Balkan States, and a meeting of their representatives is to be held, it is hoped, in September next at Brussels, which should become the seat of the international wire comptoir. It is possible, however, that difficulties may arise, as the Dutch have so far refused to accept the output quota which it is proposed to allot them.

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ACCORDING to an estimate the combined exports of wires from Britain, Belgium, France, Germany, Holland, Czecoslovakia, Austria, Sweden and the Saar were in the first quarter of this year 51,000 tons lower than in the first quarter of 1929. No country showed gains. As the American/Canadian export figures were also much lower, the world market consumed much less wires than in 1929.

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RECENT investigations and comparisons show that the hot galvanizing process of wires, which for some time was neglected in favour of the electro-galvanizing process is again gaining in favour and that the number of plants employing the hot galvanizing process is now greater than those using the electro galvanizing process.

'Round the World With the Wire Industry

Copper Rope Markets

ONE of the features of the European non ferrous metal export business is the circumstance that the demand for copper ropes, bare or covered with aluminium or nickel is in rapid increase. Germany advanced exports in the first half of this year from 1.186 to 1930 t 2.336 t, and exports from other countries were also up by 20-50%. The Mediterranean markets and the Far East are the main buyers for this material but it is remarkable that also the United States have bought 130 t 10 times more than in 1930. The volume of exports in all other non ferrous metal wires declined in Germany by 12% in all other countries by 25-30% compared with the years before.

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New Brake for Wire

A PATENT specification has just been registered in the United Kingdom for a hand brake and feeler, combined, for use on patent wire sounding machine. This brake is perfectly foolproof and reliable, is instantaneous in action and during the process of sounding will regulate the speed of the wire wheel, thus preventing the turns of sounding wire jumping off the reel and greeting foul, as so often happens. As soon as the bottom is obtained the brake comes into instantaneous action and prevents the reel from revolving any further, thus giving the person taking the cast time to screw up the machine preparatory to having in the sounding wire. It can be adjusted to any existing wire machine, and is cheap, efficient and reliable.

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THE Canadian-German Hardware Trading Co., Ltd., has been established, which will establish sales offices in Canada with the purpose of fostering sales of German wire products, bolts, screws and similar products. The German Trade had been handicapped by the absence of direct sales offices in Canada.

Hardy Pick Wire Rope Cutting Machine

A well known Sheffield (England) steel concern has recently perfected a new type of cutting machine for wire ropes, chains, and iron and steel bars. It is easy to manipulate and is very powerful. Chains up to one inch in diameter, wire ropes and steel and iron bars up to 1½ inches in diameter can be cut in a few seconds. The effectiveness of the machine is due to a combination of the ratchet and eccentric movements and the use of special alloy steel for the cutters. The castings are made of steel, and the wearing parts are case-hardened.

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British Cable Makers Equipped To Meet Railroad Electrification

FOUR of the leading British electrical manufacturing concerns have been approached by the Central Electricity Board for their views on the question whether the industry will be able to meet the enormous demands for apparatus which would be made if the electrification of main-line railroads were carried out, as advised by the Government Committee which recently reported on the subject. The view of all four is that the facilities available for the full electrical equipment of British railroads are far in excess of any demand which has already arisen, and a scheme of electrification, spread over 15 years, could be carried out easily.

The cable-making and wire-drawing industries of the United Kingdom, it is stated, could easily meet all demands from their existing facilities. They estimate that the complete electrification of the four amalgamated railroad systems would call for the provision of more than 370,000 tons of copper for the drawing of the necessary wire alone. The estimated cost of the complete project is £345,000,000 ($1.725,000,000).

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American Wire Machinery Market In Germany

THERE is at present not much of a market for American wire drawing, wire nail, wire rope, etc., machinery in Germany, but German wire makers are inclined to consider American offers for barbed wire machinery. Some American machines have recently been installed in Westfalia, although the price is approx 40% above similar German types. It is said that these machines are of greater efficiency. That this must be the case is visible from the circumstance that barbed wire is—compared with the price for ordinary galvanized fencing wire—very cheap, whereas in Germany there is a difference in price of some 22-25%. American offers for barbed wire machinery may therefore likely lead to business, inasmuch as the works in the present period of quietenesare more inclined to buy new equipment than at times when orders are flowing in quickly.

A Review of Recent Wire Patents

No. 1,813,039, PROTECTING SHEATH FOR ELECTRIC WIRES, Patented July 7, 1931, by Jules Escol, of Shatelet, Belgium.

The sheath is made of a continuous metal band, bent lengthwise. Its longitudinal joint is closed by clasping and may be made tight by double clasping and welding. The sheath may enclose one or more electric wires according to size.

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No. 1,818,845, METHOD OF AND MACHINE FOR STRANDING SPECIAL OR FIGURED WIRES, Patented August 11, 1931, by Ferdinand Fessl, of Vienna, Austria, Assignor to Felten & Guilleaume Fabrik Electrischer Kabel-Stahl-und Kupferwerke Aktiengesellschaft, of Vienna, Austria, a Company of Austria. This is a method of stranding non-circular wires to form a cylindrical layer and comprises feeding the wires into the stranding die at an angle greater than the stranding angle, the radial and tangential components of the angle being such the wires upon entering the stranding die undergo a distortion beyond the limits of elasticity whereby any tendency of the wires to untwist or unravel from their stranded position is at least partially eliminated.

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No. 1,815,210, SPRING STRUCTURE, Patented July 21, 1931, by Falconer O'Brien, of Detroit, Michigan, Assignor to L. A. Young Spring & Wire Corporation, of Detroit, Michigan.

This is a brace for helical springs and the brace, with the exception of a flat metal tie member is constructed of bent wire. A clip of cylindrical formation is also provided.

✦ ✦ ✦

No. 1,815,211, SPRING STRUCTURE, Patented July 21, 1931, by Falconer O'Brien, of Detroit, Michigan, Assignor to L. A. Young Spring & Wire Corporation, of Detroit, Michigan.

In this device, a brace is provided for the top coils of helical springs, an arm of heavy wire being provided for bridging across the frame, carrying coupling members, provided with springs and attached to the top coil of the helical springs.

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No. 1,816,381. WIRE FENCE OR GRILLE FABRIC, Patented July 28, 1931, by Arthur A. G. Land, of Chicago, Illinois.

So as to reduce the number of wire strands used and the weight of chain link wire fence fabric, the inventor employs a number of auxiliary bends of the wire, mostly small ones, so as to reduce the mesh openings in length and breadth.

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No. 1,816,833, TIE FOR REENFORCING RODS. Patented August 4, 1931, by Edward Ehlers, of Rockaway, New Jersey. This tie or clip is formed of a single length of wire, bent to form two hooks to engage under portions of one rod and to form a bight portion to engage the upper portion of the rod crossing the first rod, holding the rods in spaced relation.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 551 Fifth Avenue, New York.

No. 1,816,880, MANDRELLESS MULTIPLE DIE COIL WINDING MACHINE, Patented August 4, 1931, by Frank W. Walton, of East Orange, New Jersey, Assignor to Westinghouse Lamp Company, a Corporation of Pennsylvania. Particularly adapted for winding wire into helical coils in connection with incandescent lamp manufacture, this machine comprises means for driving the wire, a number of die members, each die having a cavity positioned to constitute a continuous cavity to engage the driven wire to bend the wire into a series of convolutions, a die rod extending from each die member with means on the end of each die rod for changing the relative position of the die members.

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No. 1,814,531, WIRE SPOKE, Patented July 14, 1931, by Edward W. Stoler, of Mansfield, Ohio, Assigner to Kelsey-Hayes Wheel Corporation, of Detroit, Michigan, a Corporation of New York.

In this wire spoke, the head is so connected to the wheel hub that the plane of the outerside of the spoke will pass through the head so that a direct thrust and pull will be effected upon the spoke in the direction of the main axis of the spoke and there will be no bending or torsional strain.

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No. 1,816,941, CHAIN FASTENER, Patented August 4, 1931, by Albin A. Thomas, of York, Pennsylvania, Assignor to United States Chain and Forging Company, of Pittsburgh, Pennsylvania, a Corporation of Delaware. This is a device for fastening the side chains of anti-skid chains and includes an elongated loop, constructed of wire, carrying a keeper, of wire, and a flat hook at one end, which engages with the keeper and retains the other end of the chain.

✦ ✦ ✦

No. 1,818,511, BASKET HANDLE, Patented August 11, 1931, by Frank B. Townsend, of Penn Yan, New York, Assignor of one-half to John E. McMath, of Penn Yan, New York. For grape baskets and the like, this handle is made of wire, and engages with wire ears at the side of the basket, to hold the handle against accidental removal.

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No. 1,817,117, FLANGED CONVEYOR BELT, Patented August 4, 1931, by Francis N. Woodman, of Clinton, Massachusetts, Assignor to Wickwire Spencer Steel Company, of New York, N. Y., a Corporation of Delaware. The invention covers a conveyor belt of the spiral wire type, provided with upstanding flanges along the outer edges, means being provided for firmly supporting the flanges, as well as means to prevent transverse shrinkage of the belt.

Reissue No. 18,142, MECHANISM AND PROCESS FOR FABRICATING FLEXIBLE SHAFTING, Reissued August 4, 1931, to Robert C. Angell, of Prince Bay, New York, Assignor to the S. S. White Dental Manufacturing Company, a Corporation of Pennsylvania. Constructed by winding a layer of wire in helical coils about a core, and then permanently enlarging the inner diameter of the coil without altering its axial length with respect to the core, it is claimed that this will relieve the pressure contact between the parts of the fabricated shaft before it is subjected to the torsional strains incident to use.

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No. 1,818,111, MANUFACTURE OF WIRE CHAIN, Patented August 11, 1931, by Richard Wirth, of Frankfort-on-the-Main, and Wilhelm Rittrolf, of Pforsheim, Germany, Assignors to Ernst Gideon Bek, of Pforzheim, Germany. The object of the invention is to provide mechanism for the manufacture of chain, particularly wire chain used in jewelry work, which may be placed in rows, so as to produce rows of chains, driven by one drive gear.

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No. 1,817,059, REENFORCE CHAIR OR SUPPORT, Patented August 4, 1931, by Dewey H. Bitney, of Albion, Michigan, Assignor to Union Steel Products Company, of Albion, Michigan. This is a one-piece wire device for supporting reenforcing rods and the like in building construction, etc.

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No. 1,819,430, CABLE GRIP, Patented August 18, 1931, by Philip J. Martin, Elizabeth, and Archibald C. Coley, of Clifton, New Jersey. This cable grip is formed of a number of wire strands woven together to form a tubular mesh, and brought together at the draft end into an eye, the eye being offset from the axis of the cable grip, and opposite the eye is positioned a protective member.

✦ ✦ ✦

No. 1,819,734, WIRE DISPENSING APPARATUS, Patented August 18, 1931, by Jacob Colitz, of Chicago, Illinois. This is a reel for dispensing wire in which the wire coil is vertically positioned so as to dispose the wire for ready removal.

✦ ✦ ✦

No. 1,816,881, PROCESS OF CLEANING WIRE, Patented August 4, 1931, by Carl John Warnke, of Elkhart, Indiana, Assignor, by Mesne Assignments, to Minneapolis-Honeywell Regulator Company, of Minneapolis, Minnesota, a Corporation of Delaware. This is a process for cleaning wire, particularly the copper-clad wire employed as lead-ins of mercury switches, and the process comprises dipping the switches and the wires successively in hydrochloric acid, nitric acid, and sodium ammonium borate. It is claimed that this process reduces the liability of the sealins around the wires from strain or rupture.

The Drawing of Round Thread Wire

Methods followed in German mills as outlined in Draht-Welt, Halle-Salle, Germany

THE thread-wire, when being drawn, must be handled most carefully; only an experienced finisher can be employed for drawing such wire, one man usually attending to 4 or 5 drums. The thread-wire, when a drum is being uncoiled, must not get entangled. If the end of one of the drums is taken up and pulled off, the wire must show a spiral form.

The wire is mostly drawn upon finishing-drums of 285 mm. dia. with a speed of 65—70 r.p.m, only open-hearth material being worked into thread-wire. The common finishing drums are still frequently brought near a catch fixed to the dump-spindle by lifting them, the catch engaging in a hook which is fixed to the drum-cross and taking the drum along. In the case of the thread-wire drums this device is done away with, a coupling, disengagable by means of a pedal lever, being arranged in the interior of the drawing-bench on the drum-spindle, it being thus possible to throw the drum into and out of gear. Where modern designs are concerned, the thread-wire drawing-drums are equipped with spring-band friction couplings which are engaged and disengaged by means of hand levers arranged laterally at the drawing-bench. The drawing-plates which, in the case of the finishing-drawing, are loosely in front of the holder, are retained in their respective positions by means of adjusting screws when thread-wire drums are coming into consideration.

✦ ✦ ✦

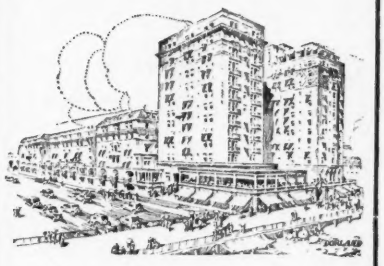
THE wire should meet the drum at an angle of 90° in respect to the longitudinal axis of the drawing-bench. In the beginning, the wire-drawer makes 3 or 4 layers settle upon the drum and then cuts them off in order to see as to whether the drawing-plate is in the right position for producing the thread. If this position is correct, the layers, after being cut off, remain lying on the edge of the drum. Otherwise they fall down, and then the layers are too wide. In the latter case the drawing-plate is somewhat removed laterally from the middle of the drum in such a manner that the wire is slightly bent in the drawing-hole. Then a new cut must be made until the drawing-plate position is correct. In the reverse case, if it is found that the test cuttings are too narrow, the drawing-plate is adjusted in an inward direction towards the middle of the drum, so as to give a slight bend to the wire. It may further happen that the wire ends of the test piece strike in an upward or downward direction; this, likewise, is not admissible. In the first case the drawing-plate is backed up in such a

(*Please turn to page 420*)

Drawing-schedule of round thread-wire.

Finished wire		Drawn out of		Number of the drawings	Sequence of the drawings Wire thickness mm	
Thickness mm	Type	Thickness mm	Type			
1,70		2,2		2	1,95	1,70
1,50		2,0		2	1,75	1,50
1,40		1,8		2	1,60	1,40
1,30		1,8		2	1,50	1,30
1,26	Bright	1,6	Annealed	2	1,42	1,26
1,20	wire	1,5	wire	2	1,35	1,20
1,10		1,5		2	1,25	1,10
1,05		1,4		2	1,20	1,05
1,00		1,4		2	1,15	1,00
0,95		1,3		2	1,05	0,95
0,90		1,3		2	1,02	0,90

The
St. Charles
On the Boardwalk
At New Jersey Avenue
ATLANTIC CITY



A Smart Hotel in America's Smartest Resort

Distinctive in convenience, comfort, good fellowship.

European or American plan.

French and German cuisine.

Sea water baths. Oceanview lounge. Sun deck. Spanish card room. All-year-round entertainment. Convenient automobile parking

IDEAL CONVENTION FACILITIES

ATTRACTIVE CONVENTION RATES

"NEP" Inhibitor

Established for 20 years.

The Inhibitor works on the Atomic Hydrogen and "NOT" on the Steel and "NOT" on the Acid.

A good Inhibitor pays for its cost in the Saving in Acid and Metal.

Over 400 Customers in America, Canada & Europe.

The Wm. M. Parkin Company

Born and raised in the Steel Industry.

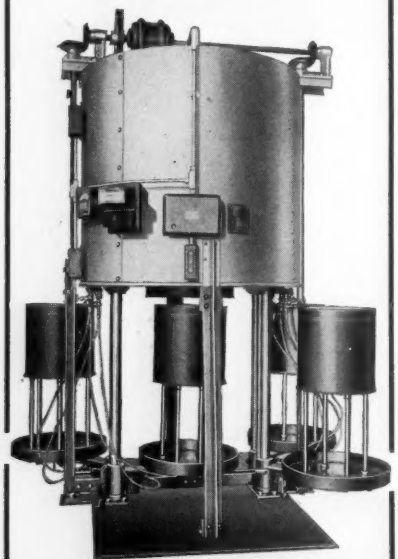
Chemical Engineers.

PITTSBURGH, PA.

KENWORTHY

Non-Oxidizing Furnaces

For The Dry Bright Annealing of Non-Ferrous Wire. Electric or Fuel Heated.



ECONOMY AND EFFICIENCY

Write For Bulletin III

Charles F. Kenworthy

Incorporated

WATERBURY, CONN.

Exports and Imports of Wire

Exports of iron and steel wire products in June and July, 1931
(In gross tons)

	July 1931	June 1931	July 1930
Wire rods	1,708	2,412	2,266
Hoops, bands and strip steel	1,610	1,695	2,185
Plain black or galvanized iron or steel wire	1,049	964	1,815
Barbed wire and woven wire fencing	2,169	1,705	3,552
Woven wire screen cloth	117	63	161
Wire rope	178	194	294
Insulated iron or steel wire and cable	33	24	23
Other wire and manufactures	320	335	640
Wire nails	943	616	844
Tacks	70	48	31
Other nails including staples	298	271	402
Bolts, machine screws, nuts, rivets and washers	437	344	821
Total, these 12 classifications	8,932	8,671	13,034

Imports of iron and steel wire and wire products into the United States
(In gross tons)

Concrete reinforcement and other bars	7,534	8,143	4,316
Wire rods	687	564	485
Barbed wire	1,492	857	388
Round iron and steel wire	244	280	272
Telephone and telegraph wire	5	4	5
Flat wire and strip steel	91	25	52
Wire rope and strand	69	206	179
Other wire	48	32	17
Hoops and bands	1,867	1,633	2,375
Nails, tacks and staples	1,091	860	611
Bolts, nuts and rivets	138	6	9
Total, these 11 classifications	13,266	12,610	8,709

EXPORTS of iron and steel products in July registered an increase of 8,881 gross tons. The largest gains registered were in skelp, 5,219 tons and in scrap, 2,970 tons.

THE trade in wood screws gained—shipments of iron and steel wood screws totaled 499,010 gross ($60,439) in July against 378,143 gross ($40,014) in June, while the trade in brass wood screws amounted to 18,460 gross ($6,176) against 16,016 gross ($4.669) in the earlier month.

ONCE again, Belgium was the chief source of imports supplying 2,433 tons concrete reinforcement bars, and 2,046 tons merchant steel bars, and Germany was again the second largest supplier.

IMPORTS of card clothing were greater than in June by about 50 per cent, totaling 15,886 square feet, valued at $22,417. The United Kingdom was, as usual, the chief source of supply, with 14,357 square feet, valued at $19,457. Germany, Belgium, Switzerland, and France also participated in this trade. Reduced receipts of wire cloth and screening (19,603 square feet) were chiefly from Germany (14,809 square feet) and Canada (3,972 square feet).

THE trade in fourdrinier and other paper-making wires rose to (83,891 square feet)—Belgium supplying 28,996 square feet—Germany 24,287 square feet, France 19,322 square feet, and Sweden 11,286 square feet.

IMPORTS of wire fencing and netting increased considerably in July—that galvanized before weaving totaling 1,039,500 square feet (all from Germany), and that galvanized after weaving 4,347,600 square feet. This last figure includes importations of 3,055,457 square feet from the Netherlands, of 685,125 square feet from Germany, and of 585,000 square feet from Belgium.

✦ ✦ ✦

The Master Wire Die Corporation has recently opened two branch offices and manufacturing plants. One at Pittsburgh, Pa., at 1411 Brighton Road, N. S. with Mr. L. H. Bittner in charge as district manager of the Pittsburgh district and the other at 1658 St. Clair Avenue, Cleveland, Ohio with Mr. Hal H. Clark as local manager in charge.

Lubrication and Application of Tungsten Carbide Dies

(*Continued from page 392*)

is cold. Would it not be possible to draw the wire hot down to a size considerably smaller than the rod, and then make the necessary cold passes to give the physical characteristics required of the wire? In some mills today the practice is to draw part way down to the size required, then anneal, and make the balance of the drafts. Tungsten carbide dies do not lose their hardness at relatively high temperatures and it is possible that when this characteristic is applied to the hot drawing of metals, even greater reductions will be made in the drawing cost.

✦ ✦ ✦

Lubrication Research

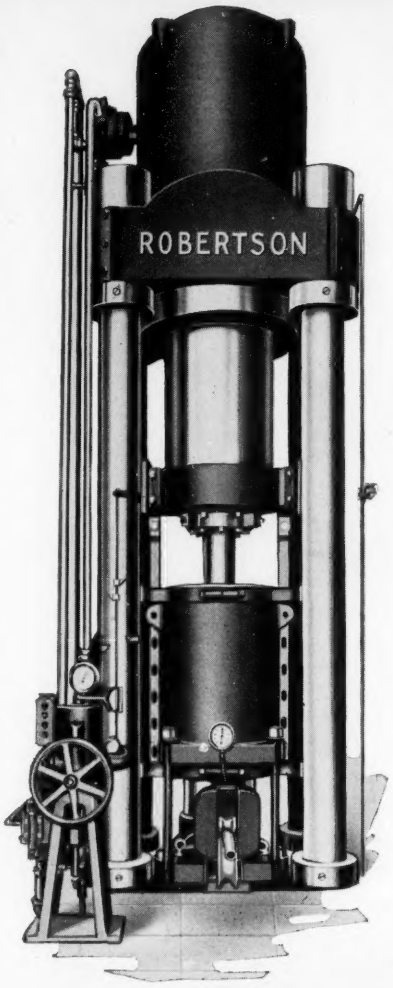
THE research department and laboratory of the Oak Chemical Products Co., Bechtelsville, Pa., has in its possession from various sources a wealth of information on products particularly adapable and suitable for the cold drawing of steel and non-ferrous metals.

A product which they have recently perfected is a copper wire drawing compound that does not require the addition of tallow to the emulsion after it has been in continuous service. They eliminate soap from the compound and consequently a high alkaline content does not remain. The alkali content diminishes with the fat content, the result being tha no tallow is required and hence a more uniform emulsion, as proportions do not have to be constantly juggled.

✦ ✦ ✦

AN interesting loose-leaf catalog on the subject of "Automatic Control Equipment Data" has been issued by the **Automatic Temperature Control Co., Inc.,** 34 East Logan Street, Philadelphia, Pa.

A copy of this bulletin which contains information as interest to superintendents and works managers of wire drawing plants can be obtained by writing for it to the company mentioned.



IN THE Lead-encasing Equipment field•••

John Robertson Co. has a rather significant position: Not only does Robertson make all types of lead-encasing equipment needed by wire and cable manufacturers, but Robertson machinery is used by most of the lead encased cable manufacturers in Great Britain, Europe, and Japan.

This is the kind of user-approval that makes for leadership.

Leadership is not won in a day!

Lead-encasing presses as they are today, cannot truthfully be said to have been evolved by the John Robertson Company alone—even though the first lead-encasing die-block was invented by John Robertson.

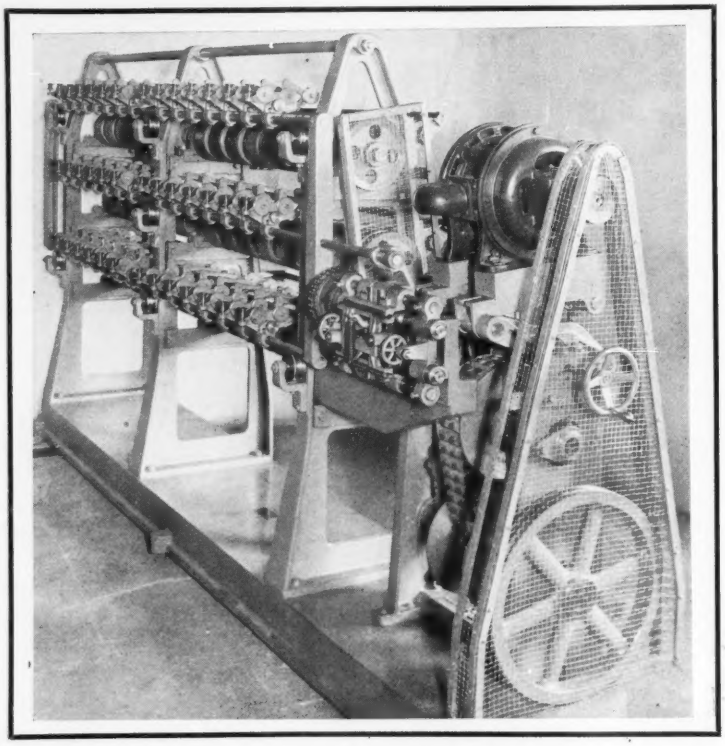
That was nearly fifty years ago, with twenty-three years lead extrusion experience before that. Since then, step by step, supplementing their own expert knowledge by the experience of the industry as a whole, Robertson engineers have brought lead-encasing equipment to the point where it has upon it the stamp of approval of the entire industry it serves . . . Such Leadership is not to be won in a day!

ROBERTSON equipment includes: Extrusion Presses, Hydraulic Pumps, Melting Furnaces, Pots, Dies and Cores, Strippers, etc. The new Robertson Hydraulic Pump is slightly higher in first cost, but maintenance and upkeep are lowered so materially that a large saving results in the end. WRITE FOR LATEST ROBERTSON BULLETINS.

John ROBERTSON CO. INC. *Pioneers-Since 1858*

123-131 Water Street Brooklyn, N.Y.

Rod, Wire, Cable, Strip and Tube Machinery



42 Wire Spooler
For Use With Multi-Strand Bright Annealing Furnace

WE BUILD

Chain Draw Benches—Multiple Coil Winders.
Flat Wire Rolling Mills—Rod Pointers.
Hollow Wire Straighteners and Equipment.
Multiple Strand Bright Annealing Units.
Stranders to Customers' Specifications.
Reelers and Spoolers for all sizes of Wire and Cable.
Reelers and Spoolers for Tinning, Galvanizing, Patenting and Annealing.

Frederick M. Conran

Designer and Builder of Special Machinery

107 Colden St., Newark, N. J.

India to Develop Wire and Wire Nail Industries

AMONG the important matter which have recently been referred to the Indian Tariff Board for investigation is the question whether protection should be given to the wire and wire nail industry in India.

The Indian Steel Wire Products Co., has a large factory at Jamshedpur close to the works of the Tata Iron and Steel Company. When the Board, soon after its establishment, considered the question of protecting the steel industry it reported in 1924 in favor of a protective duty of 60 rupees per ton on wire and wire nails. This duty was levied on the assumption that the Tata company would be in a position immediately to roll all the kinds of wire rod necessary for the manufacture of steel wire and nails.

However, it was later found that the Tata company's work extension program did not admit of the manufacture of wire rod, as special equipment was required for its production and would have to be installed at great cost. This was brought to the notice of the Government, and it was decided in 1927 to remove the protective duty on wire and wire nails, and subject them to the original duty of 10 per cent. Meanwhile the original company which owned the works went into liquidation as a result of the demand made upon it by Principal debenture holders, among whom was the Bihar and Orissa Government, which had substantial financial interest in the undertaking.

The application for renewed protection has been made by the enterprise which purchased the works from the original company in 1927. The inquiry made by the Board has related primarily to the question of the Indian steel industry being now or in the near future in a position to supply the material required for the production of wire and wire nails on a large scale.

COL. W. H. BISSELL

Pacific Coast Manager, Wickwire-Spencer Steel Co.

Col. W. H. Bissell, 47, of No. 3549 Divisadero St., San Francisco, Cal., Pacitice Coast Sales Manager for Wickwire-Spencer Steel Co., was instantly killed on Sept. 16th by the crashing of a plane in which he was travelling from Oakland northward.

There apparently was a very low ceiling and the pilot, Ray Bourdreaux, who had over 1800 air hours to his credit, presumably lost altitude, and the plane crashed into the waters of the bay at full speed.

The pilot and his three passengers were instantly killed, and the plane was so badly demolished that torches were necessary to recover the bodies.

Col. Bissell leaves a widow, the former Princess Helena Gaebesky, whom he married in Harbin while serving there in 1924, a step-daughter, Nada, 10, and a son and daughter of Col. Bissell, William Jr. and Jane survive.

Col. Bissell's place has been assigned temporarily to B. C. Scott of Portland, pending the appointment of a permanent manager.

A funeral was held Friday, Sept. 18th, with full military honors due his rank as Colonel.

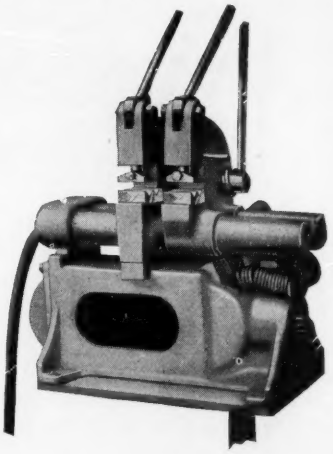
THE Waterbury Farrel Foundry & Machine Company, machinery builders, of Waterbury, Connecticut, announce the formal opening of a sales office in Chicago, serving the Chicago district, northern Illinois and Wisconsin. The office is in charge of **Mr. A. R. Nichols** and is located in the Chicago Daily News Building, 400 West Madison Street.

Mr. Nichols takes up his new duties as Chicago representative after several years sales and engineering experience during which time he was affiliated with the home office in Waterbury.

"--and these results have been very satisfactory. We would not want to be without this machine."

Those are the words of one user of

MICROMETER PRECISION MICRO-WELD TRADE MARK



Write for full details of this NEW kind of butt-welding and spot-welding machine. It is more compact; more efficient and lower-priced than others—a statement we will gladly prove.

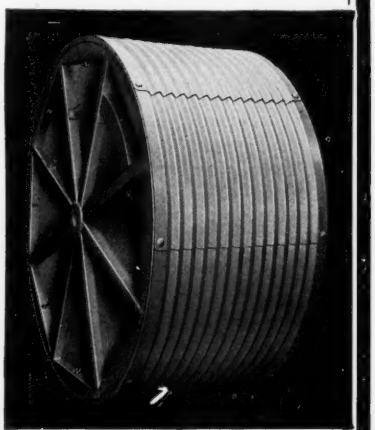
MICRO PRODUCTS COMPANY

140 Industrial St. **Peoria, Ill.**

European Office, H. A. Schlatter & Co.
Zurich, 1, Limmatquai 32, Switzerland.

"Red Head"

Steel reels



Manufactured and sold by

R. B. HAYWARD COMPANY

1714-1736 Sheffield Ave., Chicago

Under license arrangement with Electrical Research Products, Inc. Subsidiary of Western Electric Company, Incorporated.

SILVER-BRAZING

is the *accepted* way of splicing copper, brass or other copper-alloy wire.

And

HANDY SILVER SOLDERS

are the *accepted* solders

Because the compositions are scientifically arrived at and produced under rigid laboratory control to give the best physical and electrical qualities—and (this is important, too) **always the same.**

Write for Bulletin No. 3-10WW or tell us about your brazing problem.

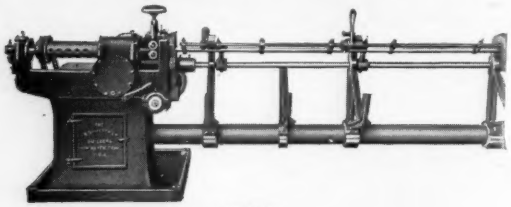
Handy & Harman

57 William Street
New York City

FOR UNUSUAL SPEED

AND

ACCURACY



USE

Shuster Wire Straightening and Cutting Machines

They make the wire absolutely straight, and each length is an exact duplicate of the one before it.

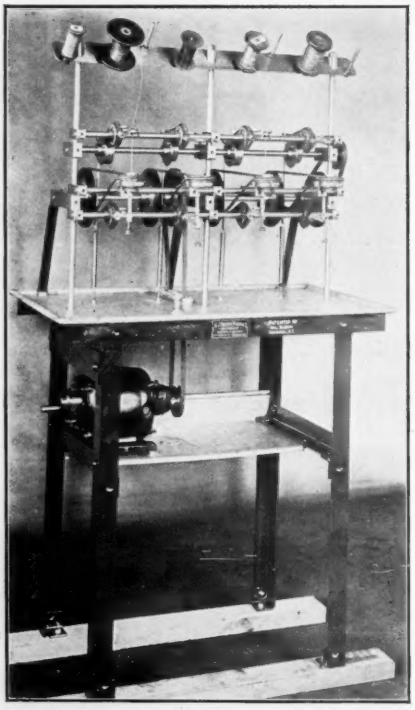
Steel Fliers mounted in Timken Roller Bearings, and other special patented features. Built to operate continuously, year in and year out.

THE F. B. SHUSTER COMPANY

NEW HAVEN, CONN.

Straightener Specialists Since 1866

The Haddow Die Re-Cutting and Polishing Machine will lower your die re-cutting cost to a fraction of present costs



Why do you continue to pay a die cutter and pay for diamond dust to remove a large percentage of your diamond from your dies? Diamond that has done no work—when, by the use of the Haddow Die Recutting Machine you may use practically all your diamonds to draw wire, especially in the small sizes.

ONE MONTH'S SHOP PRODUCTION

Total number of dies cut —1047

Total number of hours required—182.5

Average number of dies per hour—5.73

Number of operators—1

With only one man—This machine will do the work now requiring four to six men in less time and at lower cost.

4 HEAD MACHINE—Also Made in 6-Head size (With 2 Heads for Heavier Dies).

WILLIAM HADDOW

17 Eastern Ave.
Ossining, N. Y.

Soap As a Lubricant

(*Continued from page 395*)

Charting Test Results

IN preparing the chart showing comparative costs and efficiencies we have arrived at the efficiency factor by adding the number of average and smooth coils.

Here we take "A" as the standard showing 100% cost and efficiency up to the time of the test.

B—112% efficiency at 80.6% of the previous cost.

C—100% efficiency at 80.3% of the previous cost.

D—101.2% efficiency at 98.3% of the previous cost.

E—103% efficiency at 90.2% of the previous cost.

Here is a mill that wanted to find out about soap as a lubricant. They were getting good results but someone had an idea they could be better. Nothing was overlooked in finding out—and what a find. One lubricant as efficient but at lower cost per ton of wire drawn. Two were somewhat better at lower costs and one that stands out like a Chic Sale masterpiece in the prairie. A soap that increases the efficiency 12% over anything they ever had before at a per ton cost 19.4% lower than were ever able to draw wire before. It might well be that "B" brand cost more per pound, but the figures prove its worth. What a chance for the cost department —12% more efficiency—19.4% lower cost. Gives them an edge to work on that is remarkable.

The cost per ton of wire drawn was a trifle under 15½c.

The amount of soap required to draw a ton of wire was frm ¾ lb. to slightly over 2 lbs.

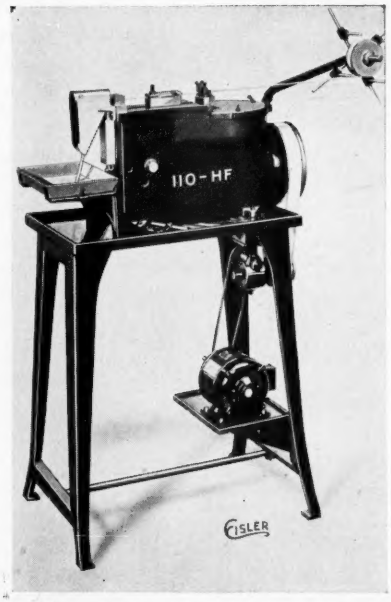
Wire Association Will Develop Information on Wire Drawing Lubrication

IN conclusion, despite the importance to the wire industry of the lubricant very little has been written about it. Such things as are known are developed in the mills, passed along by word of mouth or by the migration of workmen. These things you know

I could use and vice versa—but how to bring about the exchange? The answer is the **Wire Association.** Even tho only a year old, the association has proven of real value on answering questions, exchanging information, etc. Now that the preliminary organization is all complete, things are going to happen. We are going to work closer together and I am sure that by next year we will have cleared up a number of questions, operated numerous tests and know considerably more about our jobs, our problems and our products than we now do. I, for one, am frank to admit that there are any number of things I would like to know, and I hope to have the pleasure of discussing some of them with you next year.

✦ ✦ ✦

Heavy Type Ribbon Metal Cutter



A NEW heavy type ribbon metal cutter for cutting solid ribbon or mesh from spool or reel has been developed by the Eisler Electric Corp., of Newark, N. J. This machine has a cutting thickness from .001″ to .025″; a cutting width from 1/16″ to ¼″ and an adjustable cutting length from 1/64″ to 3¼″, producing from 75 to 150 cuts per minute depending on the length.

The machine itself weighs 300 lbs. and is operated by a 1750 r. p. m. ¼ h. p. electric motor with a reduction gear drive.

HUDSON WIRE CO.

Successors Royle & Akin

Fine Wire Manufacturers

OSSINING — Established 1902 — NEW YORK

Manufacturers of Fine Bare Wires

Copper Wire Specially Processed for Enameling Purposes

Copper	Lead
High Brass	Zinc
Low Brass	Commercial Bronze
Pure Tin	Phosphor Bronze
Cadmium	Silver Plated Copper
Bronze, Various Grades	False Gold

10%, 18%, 30% Nickel Silver

LAHN

False Gold — Copper — Silver Plated Copper

BRUSH WIRES — CRIMP and STRAIGHT

Brass	Copper
Steel	Nickel Silver
	Phosphor Bronze

Metallic Fibre for Packing Purposes

STEELSKIN

REG. U. S. PAT. OFFICE

For High or Low Carbon Wire

WIRE DRAWING SOAPS

Established 25 years.

R. H. MILLER CO., Inc. — Homer, N. Y.

BRAND

"B"

Wire Drawing Soap Powder

Made from high titre Palm Oil stock for high carbon drawing.
Proven by test to lower costs and improve efficiency.

Manufactured exclusively for wire drawing by

THE J. T. ROBERTSON CO., INC.

SYRACUSE, N. Y.

Wire drawing soap specialists since 1893.

World's Submarine Cable

(*Continued from page 405*)

were puzzled when they were unable to telephone instructions to gunners!

Location and Installation

THE new cable extends from Crissey Feld, San Francisco to Point Cavallo near Fort Baker, Marin County. The course of the cable follows a carefully selected route to avoid large rocks, pinnacles and depressions on the floor of the bay.

The new line replaces two small ones. One other small cable is still in use. The large cable was shipped to San Francisco through the Panama Canal in five 2400 foot lengths and one 800 foot length, each on a separate steel reel. The 2400 foot lengths were spliced together and the 800 foot reel is held for emergency use.

Welding the steel armor around a splice on the new double armor telephone cable, one of the largest in the world, recently laid across the Golden Gate.

TOWED by a tug the cable barge Pacific reeled out the huge cable foot by foot over the 12,000 foot stretch between Crissy Field on the San Francisco side and Point Cavallo on the Marin County shore in 40 minutes.

On account of its length, it was made up in five sections of twenty-four hundred feet each, each steel reel and its cable weighing 35 tons. A special stiff-leg derrick was constructed to lift the five reels onto the boat which brought them from the Atlantic Coast to San Francisco through the Panama Canal.

✦ ✦ ✦

RUESCH

WIRE FLATTENING MILLS

COILERS — DRAW BENCHES — STRAIGHTENERS — SWAGERS

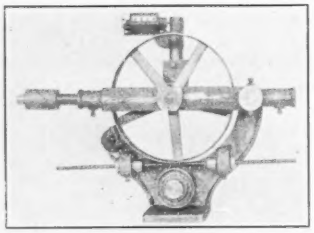
SPECIAL MACHINERY DESIGNED AND BUILT FOR WIRE, TUBE AND BRASS MILLS

H. J. RUESCH MACHINE CO.

409 MULBERRY ST. NEWARK, N. J.

IMPROVED

Wire Measuring Machine



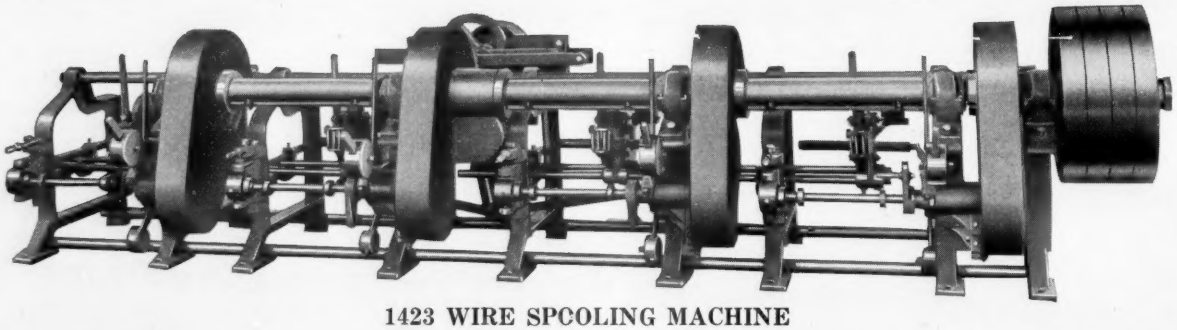
For measuring bare and insulated wire.
The new patented double grip model gives you more correct measurements.
You save the difference.
Eight different types will measure the finest wire up to and including 3-inch cable.
All equipped with "VISIBLE" counters.

Manufactured by

HOPE NARROW FABRIC CO.

68 Althea St., Providence, R. I.

Builders of Improved Braiding Equipment for more than 25 Years.



1423 WIRE SPOOLING MACHINE

An up-to-date design of automatic wire spooler or gang winder built for either four or six reels. Built in three sizes for bobbins from 3″ to 24″ diameter. Each winding arbor equipped with automatic traverse, measuring counter, and automatic stop on completion of wind. Speed 250-600 feet per minute. A single operator only required.

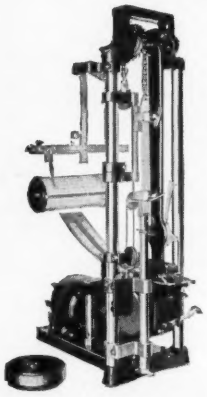
THE TORRINGTON MFG. CO.

TORRINGTON, CONN.

After they were unloaded, nearly two weeks were required to splice the five spools together and electrically weld the outside armor wires before placing the 163 tons of cable on the barge. A specially prepared survey on the floor of the bay was prepared and the cable was laid, not in a straight line but along a zigzag patch to avoid large rocks, pinnacles, and depressions below the water's level.

✦ ✦ ✦

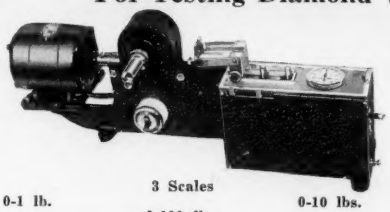
Tensile Strength Tester for Wire



A SPECIAL model for tensile testing strength of wire—type 265— has been developed by the Amthor Testing Instrument Co., of Brooklyn, N. Y. The machine comes as a complete assembled unit and is operated by a 1/6th h. p. motor. There are two scales. One for reduction when testing specimens are of light breaking strength and the other covering the entire capacity range of the tester. The unit operates in conjunction with the indicator and requires no care during the test. In addition to recording both the tensile strength and elongation on the chart, the proportion of stretch under the increasing load is clearly shown. This graphic picture presents an important test aid in determining the physical strength properties of the test specimen.

The special wire testing apparatus has a speed unit to provide pulling speeds from ½ to 1½ inches per minute and special type clamps are provided for the ranges of wire to be tested.

For Testing Diamond Wire Drawing Dies



THE

"Triplex" Dynamometer

Accurately indicates the traction required to draw wire. May be set so that indicator hand remains at maximum reading, allowing ultimate break tests to be made.

We will place this dynamometer on trial in your plant upon request.

Your Inquiries Solicited

3 Scales

0-1 lb. 0-10 lbs. 0-100 lbs.

Length 25" Weight 38 lbs. Height 8½"

ROBERT MILLER

221 NORTH 23d ST., PHILADELPHIA, PA.

ELECTRIC and FUEL FURNACES

for

Ferrous and Non-Ferrous Wire Products

Complete heating equipment for strand annealing, billet heating and intermediate operations.
Bright annealing furnaces for ferrous and non-ferrous metals.

"Furnace and Fuel to Suit Conditions"

BETTER HEATING W.S. ROCKWELL CO. INDUSTRIAL ESTABLISHED 1888 FURNACES NEW YORK LOWER COST

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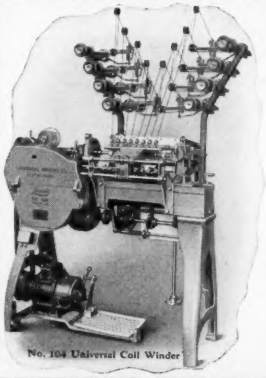
Industrial Heating Equipment

1885-1 50 Church Street (Hudson Terminal Building) New York



No. 104 Universal Coil Winder

An interesting development for more efficiently producing paper-insulated coils. Paper is injected automatically without attention from the operator. Fully adjustable for a wide range of coil and wire sizes.

Six other machine types complete a line of coil winders answering any possible manufacturing need.

Catalog is available on request.

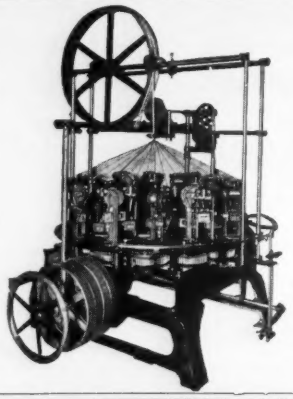
UNIVERSAL WINDING COMPANY
BOSTON

LEESONA

WIRE DRAWING Machinery and Equipment

Rod Frames—16" Frames
8" Frames—Take-Up Frames
Wire Pointers—Puller Tongs
General Castings for Wire Mill Use
Circulars on Request.

E. J. SCUDDER FOUNDRY & MACHINE CO. TRENTON N.J.



WIRE BRAIDERS

Multiple Head Wire Covering Braiders

Single, Double or Triple Deck Wire Covering Braiders

Single, Double or Triple Deck Cable Braiders

FIDELITY MACHINE COMPANY

Philadelphia, Pa.

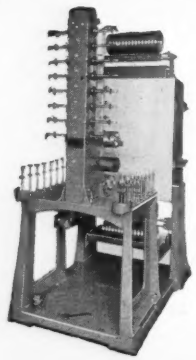
WIRE BUNCHING MACHINES
WIRE STRANDING MACHINES
TWINNING MACHINES Up to And Including SEVEN CONDUCTORS

(Manufactured under the Dawes Patents)

HASKELL-DAWES MACHINE CO., INC.

Ontario St. Below Trenton Ave.,
Philadelphia, Pa.

(4)



AIMCO R-16 MODEL WIRE ENAMELING MACHINE

Enamels Wire 36 B. & S. Gauge and Finer.
Electrically Heated Oven with Thermostatic Control.
Finished Wire Spindles Individually Controlled.
Traverse is Adjustable for Different Spool Dimensions.
Low Cost of Enameling Wire is Due to Ease of Operation and Number of Spindles one Operator can tend.
Self-Contained on Bed-Plate.
Motor Driven.
Motor included.

EST. 1855 AIMCO INC. 1915
"American" INSULATING MACHINERY COMPANY
REG. U.S. PAT. OFF.

517 Huntingdon St.
Philadelphia, Pa., U. S. A.

WIRE BUNCHING MACHINES

New Type High Speed

NEW ENGLAND BUTT COMPANY

Office and Factory
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Western Office
20 North Wacker Drive, Chicago, Ill.

We build a complete line of Stranding Machines, Cabling Machines, Closing Machines, Rubber Strip Covering Machines, Measuring Machines, and Other Allied Machines for the Wire Trade.

OUR WIRE MACHINERY CATALOGUE SENT ON REQUEST

Toilet Pin Standardization

THE Federal Trade Commission has reconsidered its prior action on the common or toilet pin industry as adopted at a trade practice conference held in New York City, May 27, 1930, and the industry has accepted the rules with the suggested changes.

Rules approved by the Commission, designated Group 1, refer to such practices as secret payment of rebates; discrimination in price; selling goods below cost with the intent of injuring a competitor; imitation of trade marks, trade names, and slogans; labeling boxes or papers of iron or steel pins with the words "bank," "dressmakers," "silk," "satin," "voile," "chiffon" or similar words, when this deceives the public into believing such pins are rust-proof or suitable for the fabrics mentioned; and sale of any product by false means or device.

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Brass Used In Pin Manufacturing

COMPILED by the American Bureau of Metal Statistics).

The following is the use of brass in pin manufacturing in the United States, in pounds:

1923	4,200,000
1925	4,000,000
1927	4,800,000
1929	5,000,000

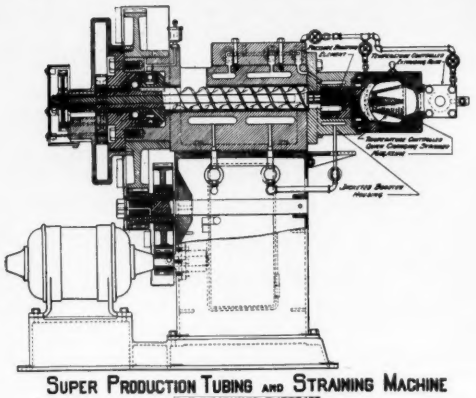
Reports from nine pin manufacturers accounting for about 75% of the industry indicate that the total use of brass in 1930 amounted to 4,200,000 pounds, a decrease of 16% from 1929. Copper content of pin brass ranges from 61 to 75%, and zinc content from 39 to 25%.

Eighteen manufacturers of snap fasteners and clasps, hooks and eyes, eyelets and grommets used the following alloys in 1930, in pounds:

Brass	6,409,153
Copper	210,000
Phosphor bronze	40,800
Nickel silver	1,087,833

We estimate that these figures account for from 60 to 75% of the total use of non-ferrous metal for these purposes.

Of Vital Interest to Insulated Wire Industry



SUPER PRODUCTION TUBING AND STRAINING MACHINE
PAT. Nos 1813868 & 1886470

Uniformity of diameter of extruded wire covering

Uniformity of covering speed

Covering speed only limited by panning or reeling efficiency. Its maximum covering speed has never been reached for this reason

Perfectly clean insulation assured by sealed delivery of strained compound to the wire, a feature of exceeding value in water test wire

Tremendous reductions in insulating costs by more than doubling speed of production, and additional reductions by combining straining with the tubing operation

Thin walls on small wires, impossible on the worm propelled extruder, are produced at excessively high speeds with ease

Soft compounds practically impossible to extrude economically with worm feed alone, extruded at high speed.

For Detailed Information Address—

Corone Wire Insulators, Inc.
PUTNAM, CONN.

National Electric Products Corp. is putting out a non-burning rubber covered copper wire, specially adapted for use in buildings and homes. This new wire is called "fire stop". National Electric Products Corp. has a basic patent covering this new type of insulation.

✦ ✦ ✦

WANTED—INSULATED WIRE SALES ENGINEER, who has had experience with enamel, cotton and other insulated wires, preferably in the sales end, and who has a knowledge of motors, armatures and transformers. State age, education and past employment, Box 600, Wire & Wire Products, 551 5th Ave., New York, N. Y.

The Acme Inc., Jersey City, N. J., George E. Vaughn, Pres., recently purchased the assets of the Acme Handle Co. Inc., from the receivership and has one of the largest, finest equipped plants in the East for wire forming of every description. This company is now operating in the neighborhood of sixty automatic wire forming machines and is prepared to fill orders for wire forms of any type, shape or kind.

Wire Drawing Compounds

✦ ✦ ✦

OAK DRAW 77

Eliminates Lime, soap and lubricants on Steel Bars or Wire—Low Carbon Stock.

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OAK SUPER

For copper and non-ferrous wet or dry

Can also be used for bright finished steel wire.

✦ ✦ ✦

Now used by many leading mills

✦ ✦ ✦

We can solve your drawing problems.

✦ ✦ ✦

Write for details.

Oak Chemical Products Company
Bechtelsville, Pa.

DIAMOND DIES

When purchasing
Diamond Dies
avail yourself of the
forty years' experience
of the famous

P-H-I-L-I-P-S W-O-R-K-S

Any inquiries will be dealt with promptly

RAW MATERIAL DEPARTMENT

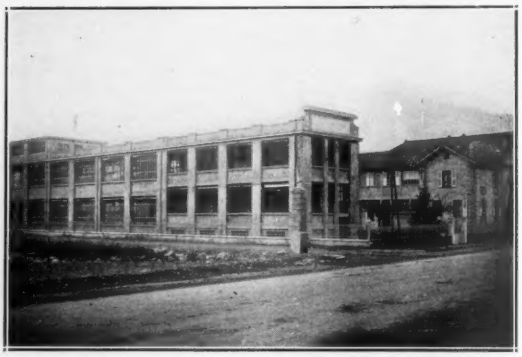
PHILIPS LAMP WORKS

EINDHOVEN **HOLLAND**

BALLOFFET

1870 — 1931

The Quality Diamond Dies



Balloffet Diamond Wire Dies Co., Inc.

13-15 East 22nd St., New York City

PLANTS AT

New York Lagnieu (France) Cluses (France)

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DETROIT WIRE DIE COMPANY

DIAMOND AND TUNGSTEN CARBIDE DIES FOR WIRE DRAWING

We manufacture our complete diamond dies in this country from the very finest diamonds that are obtainable. We have made a study of wire drawing problems and manufacture the dies to fit your problems.

WE WOULD APPRECIATE AN OPPORTUNITY TO SERVE YOU

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DIAMOND DIES

100 FIFTH AVE · NEW YORK

"The House of Service"

Bellet Diamond Die Works

Manufacturers of

DIAMOND DIES

and

COMPOSITION DIES

Factories { Trevoux—France / New York, N. Y.

New York Office 315 Fifth Ave.

Drawing Round Thread Wire

(*Continued from page 409*)

manner that it becomes somewhat inclined towards the centre line of the drum. In the reverse case, i. e. if the wire strikes downward, the drawing-plate is so backed up that it is somewhat inclined in the outward direction, viz. away from the drum. All these circumstances must be ascertained at the test pieces previously to the drawing of the wire with thread.

Plating and Coloring

USUALLY, after the finishing, the thread must be of a light brightness, and just a slight tinge of copper is admissible on its surface as, in working up the wire it is frequently nickeled, and too thick a copper plating would be adverse to this. In order to keep the hue of copper as thin as possible, various methods are employed. In mixing the ingredients of the barrels behind the drawing-drum—with the exception of the last one which, in the case of thread-wire, only contains water and yeast—as is generally customary with the grease soluble in water, a special

The Waterbury Wire Die Co.

Diamond, Composition and CHILLED IRON DIES

Waterbury, Conn.

alligation is admixed to the copper bath (only one copper bath being used). The alligation in question is produced in the same manner as the grease soluble in water, only the tallow being substituted by rape-seed oil, 60° Bé. being sufficient for the sulphuric acid to be added. The alligation thus attained must stand for some days before it can be used. The quantity to be added amounts to abt. 2—3 kilos, this being stirred together with hot water and added to the copper bath in a cooled state. The pickling-, the copper- and the initial bath—setting aside the aforementioned copper bath addition—are stirred together same as the bath for annealed wire. In the event of the wire showing too much of a copper coating, a little less of sulphate of copper is added.

In some Works the thread-wire is passed through yeast during all the drawings. In this process resource is taken to the addition of 1/10 litre of petroleum for each of the barrels behind the finishing-drums. The contents of the drawing-barrels are then composed of beer-yeast and 1/8 litre of sulphuric acid for each barrel. In this instance the pickling-, the copper- and the initial bath are likewise stirred together in the same manner as in the case of the finishing-drawing for annealed wire.

The above-described methods make it possible to draw the thread-wire in such a manner that, after the finishing-drawing, it shows only a thin copper tinge on its surface.

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W. C. Buchanan, vice-president of the Keystone Steel & Wire Company, Peoria, Ill., was elected to the directorate at the annual stockholders' meeting held Monday, August 31st.

Prior to his association with the company, which has been only for a period of two years, he was connected with Floyd A. Deahl and associates and the Trumbull Steel Company.

✦ ✦ ✦

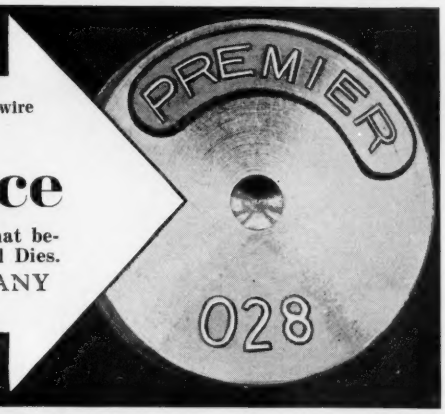
The Third paper on Automatic Combustion Control Systems will appear in November

The results you get in drawing wire depend upon the

Experience

of your die maker—we learned that before we made "Premier" Diamond Dies.

DRIVER-HARRIS COMPANY
HARRISON, N. J.



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for **Wire, Rod, Tubing and Specialties**

Made by patented precision machinery insuring exact shape duplication. Lower production costs decrease rejections

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ON THE MARKET TODAY
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FOR SAFE and SUSTAINED PRODUCTION

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Manufacturers of
WIRE DRAWING DIAMOND DIES

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WIRE DIE WORKS

Diamond Dies in all sizes
For all kinds of Wire
Crushing Bortz and Splints.
Dies repaired like new.

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For more complete information, consult the annual Directory, Index & Buyers' Guide.

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See Furnaces—Various Headings

ANNEALING POTS
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ARMORING EQUIPMENT
Amer. Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
John Robertson Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

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Vaughn Machinery Co., Cuyahoga Falls, O.

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BRAIDER CARRIERS
Mossberg Pressed Steel Co., Attleboro, Mass.

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E. J. Scudder Foundry & Machine Co., Trenton, N. J.

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Vaughn Machinery Co., Cuyahoga Falls, O.

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H. J. Ruesch Machine Co., Newark, N. J.

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Oak Chemical Co. Bechtelsville, Pa.

COPHOLDERS
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Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

DIE TESTING DYNAMOMETER—To Indicate Traction Required To Draw Wire
Robert Miller, Philadelphia, Pa.

DIES—Chilled Iron
Waterbury Wire Die Co., Waterbury, Ct.

DIES—Composition
Addor Wire Die Works, N. Y.
Bellet Diamond Die Works, N. Y.
F. Krause, Inc., Jersey City, N. J.
Urdika Wire Die Works, Inc., New York
Vianney Wire Die Works, New York, N. Y.

DIES—Diamond
Addor Wire Die Works, N. Y.
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Bellet Diamond Die Works, N. Y.
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Detroit Wire Die Co., Detroit, Mich.
Driver-Harris Co., Harrison, N. J.
F. Krause & Co., Inc., Jersey City, N. J.
Master Wire Die Corp., New York, N. Y.
Union Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York.
Waterbury Wire Die Co., Waterbury, Ct.

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DIES—Repairs & Re-Cutting
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Bellet Diamond Die Works, N. Y.
Cochaud Wire Die Corp., New York.
Detroit Wire Die Co., Detroit, Mich.
Driver-Harris Co., Harrison, N. J.
F. Krause & Co., Inc., Jersey City, N. J.
Vianney Wire Die Wks., N. Y.

DIES—Recutting and Repolishing Machine
Wm. Haddow, Ossining, N. Y.
F. Krause, Inc., Jersey City, N. J.
Vianney Wire Die Works, New York, N. Y.

DIES—Rod and Tube Drawing
Carboloy Co., Inc., Newark, N. J.
Master Wire Die Corp., N. Y.
Union Wire Die Corp., N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Tantalum Carbide
Vianney Wire Die Works, New York, N. Y.

DIES—Tungsten Carbide
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Driver-Harris Co., Harrison, N. J.
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Union Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

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Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry & Machine Co., Waterbury, Conn.

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GALVANIZING ENGINEER
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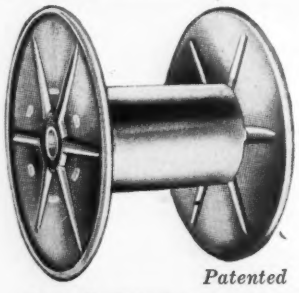

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Reels and Spools
Made of Pressed Steel

A complete line of reels and spools for every phase of manufacturing, handling and shipping. They are practically indestructible. Send for catalog of stock designs or for quotation on your own specifications.

Above: a curled flange, pressed steel spool for handling and shipping. Pressed-in radial ribs give added strength. Barrels are provided with our patented rib filler.

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Makers of "Mosspeed" Braider Carriers.

A VERY handsome catalog, No. 109, describing in detail polishing and plating equipment and supplies has been issued by Hanson-Van Winkle-Munning Co., of Matawan, N. J.

This catalog is divided into four sections. 1. Buffing and polishing supplies. 2. Plating supplies. 3. Plating equipment. 4. Buffing and polishing equipment. It is a cross index for ready reference and in addition to containing descriptions of their products, carries very interesting technical information in the form of tables of Electrical Units, Weights and Measures, data on Metric System, a table on equivalent weights and measures of Metric and English systems and Electromotive Series table and a table showing a per cent by weight of the component parts of salts commonly used in electroplating.

A copy can be obtained by writing to the company mentioned.

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The Next Article in The Discussion, Electro Galvanizing vs. Hot Galvanizing, Will Appear in the December Issue of WIRE and WIRE PRODUCTS.

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Consulting Engineer
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Specializing in Galvanizing Plants Designed and Installed
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also Composition Dies

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Vaughn Machinery Co., Cuyahoga Falls, O.
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Amer. Lime & Stone Co., Bellefonte, Pa.

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Torrington Mfg. Co., Torrington, Conn.
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H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

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H. J. Ruesch Machine Co., Newark, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Insulating
American Insulating Machinery Co., Phila.
Corone Wire Insulators, Inc., Putnam, Conn.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lead Encasing Presses, etc.
John Robertson Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Measuring Wire & Cable
Hope Narrow Fabric Co., Providence, R. I.
New England Butt. Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Panning
American Insulating Machinery Co., Phila.

MACHINERY—Pointing
Fred'k M. Conran, Newark, N. J.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
The Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rivet
Waterbury-Farrell Fdry & Machine Co.,

MACHINERY—Rod
Fred'k M. Conran, Newark, N. J.
Morgan Const. Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrell Fdry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Strip Covering
American Ins. Mach'y Co., Phila., Pa.
Corone Wire Insulators, Inc., Putnam, Conn.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
Corone Wire Insulators, Inc., Putman, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
Fred'k M. Conran, Newark, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry and Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
Fred'k M. Conran, Newark, N. J.
American Insulating Machinery Co., Phila.
Hope Narrow Fabric Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Spring Making
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
H. J. Ruesch Machine Co., Newark, N. J.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Straightening Hollow Wire
Fred'k M. Conran, Newark, N. J.

MACHINERY—Stranding
American Insulating Mach'y Co., Phila Pa.
Fred'k M. Conran, Newark, N. J.
Haskell-Dawes Machine Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

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BUYERS' GUIDE, Continued

MACHINERY—Strip Steel
Broden Const. Co., Cleveland, O.
Fred'k M. Conran, Newark, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Swaging
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Worcester, Mass.
Waterbury-Farrell Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Taping
Amer. Insulating Mach. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Company, Paterson, N. J.

MACHINERY—Testing Die Traction
Robert Miller, Philadelphia, Pa.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Fred'k M. Conran, Newark, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrell Fdry. & Machine Co., Waterbury, Conn.

MACHINERY—Welding Wire
Micro Products Co., Peoria, Ill.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Universal Winding Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Insulating Machinery Co., Phila.
Broden Const. Co., Cleveland, Ohio.
Fred'k M. Conran, Newark, N. J.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Manufacturing Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Watson Machine Company, Paterson, N. J.

PACKING—Metallic Fibre
Hudson Wire Co., Ossining, N. Y.

POINTERS—Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

POTS—Lead Melting
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead Encasing
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

PULLERS—Wire
E. J. Scudder Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
John Robertson Co., Brooklyn, N. Y.

REELS AND SPOOLS—All Kinds
R. B. Hayward Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

REEL AND TENSION STAND—
Sleeper & Hartley Inc., Worcester, Mass.

REEL CRUTCHES
R. B. Hayward Co., Chicago, Ill.
Watson Machine Co., Paterson, N. J.

ROLLING MILLS
Fred'k M. Conran, Newark, N. J.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrell Foundry & Machine Co., Waterbury, Conn.

SOAPS—Wire Drawing
R. H. Miller Co., Homer, N. Y.
J. T. Robertson Co., Syracuse, N. Y.

SOLDER—Silver
Handy & Harman, N. Y.

SPOOLS—Annealing—Detachable Head Handling—Wire Stitching
Mossberg Pressed Steel Corp., Attleboro, Mass.

TRUCKS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS
H. J. Ruesch Machine Co., Newark, N. J.

VULCANIZERS
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WIRE—Various Kinds
Hudson Wire Co., Ossining, N. Y.

This is a carefully classified index of concerns who specialize in this industry and who advertise regularly in WIRE & WIRE PRODUCTS. Please mention WIRE when writing to these firms.

WATERBURY-FARREL

TANDEMS

No. 2 5-die machine, block type with stripper and optional floor spooler. Wire finished in coils or spooled, as preferred. Starting size ⅜ in. copper rod, finishing at No. 5 or No. 6 B. & S. gauge. Flexible-coupled enclosed herringbone drive. Antifriction bearings throughout. Aluminum swing cover for dies.

THE CULMINATION OF MORE THAN 25 YEARS AS BUILDERS OF CONTINUOUS WIRE DRAWING MACHINES OF MERIT

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CHICAGO OFFICE:
Chicago Daily News Bldg.

A machine that meets the present day demand for high speed and maximum production efficiency. The No. 2 machine is built in both 5 and 6-die constructions. The No. 1 tandem machine is built in from 5 to 10-die construction. May we send you our complete catalogue of wire drawing machinery?

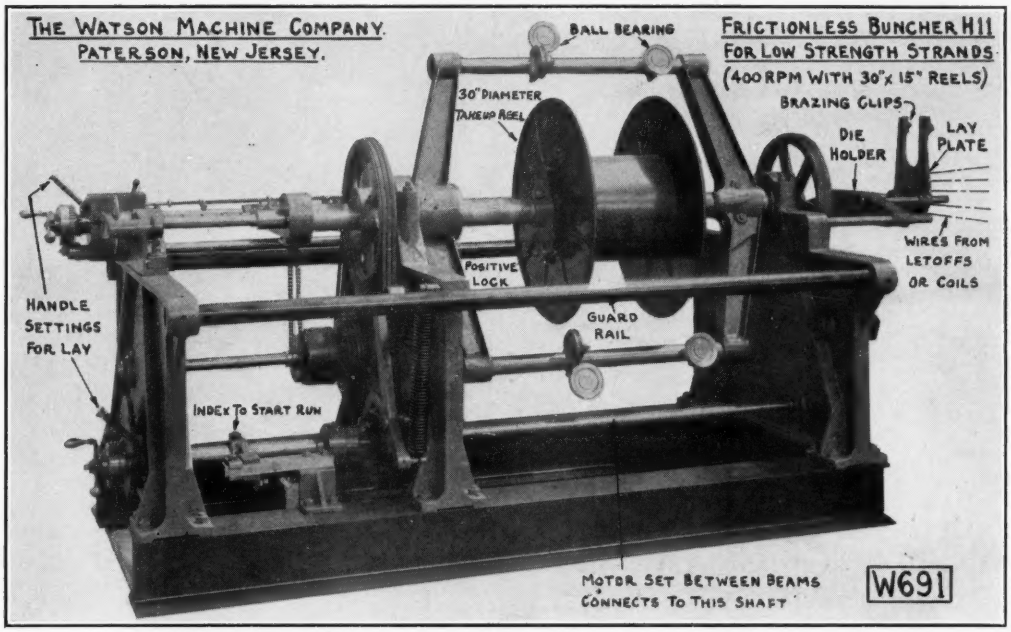
THE WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

ENGINEERS - FOUNDERS - MACHINISTS

FRICTIONLESS BUNCHER H II *(For Low Strength Strands)*



An Entirely New Bunching Principle

This machine is primarily intended for the bunching and twisting of products of low tensile strength; which in the past have of necessity been twisted on small-diameter low-content Takeup Reels due to their inability to drag a larger Reel against Friction. Any wire or cord having sufficient tensile strength in each of its component members to rotate the Spools from which they are fed can be twisted together in this machine to fill its Takeup Reel. It can be used for any number of wires where the lay in one direction for all component wires is satisfactory; for final product diameters up to one-half inch.

Buncher can be fed from coils on Floor (*on soft wire*) thus eliminating a spooling operation.

There is no Capstan or Slip-Friction in this Buncher.

See separate bulletins for various types of Letoffs for Feed Spools.

Write Us For Full Description of This Machine Or Larger Sizes.

ELECTRICAL WIRE AND CABLE
WIRE ROPE and CORDAGE MACHINERY

THE ATLANTIC WIRE CO.

MANUFACTURERS OF
IRON AND STEEL WIRE
BRANFORD, CONN.

RECEIVED JUN 25 1931

June 24, 1931.

Wire Association,
551 Fifth Avenue,
New York

Gentlemen: Attention: Mr. Richard E. Brown, Secretary.

This will acknowledge your letter of the 23rd requesting us to join the Wire Association.

We are very glad to join this Association and glad the same has been organized, for the industry needs something of this character which will prove of benefit to all those manufacturing and interested in the various grades of wire. We believe that the old type system of keeping things under lock and key when you conceived a new idea which works out to show economy and saving is a shortsighted policy, in other words, to try and keep these under cover to the extent that you reduce your costs and then allow your sales department to go out and cut prices in proportion to the saving effected.

This Company has always had an open policy and has always been willing to have other wire manufacturers visit our plant. If there are any ideas which we have which are of value and interest, they are entitled to the same, for if our sole object in business is simply to make money, it is a shortsighted policy to say the least; whereas if the wire manufacturers as a whole will cooperate and exchange ideas to the extent of reducing their costs with the idea of having these savings reflected in profits, we will have gone a long step forward in operating a wire industry to the benefit not only of the manufacturers, but of those who are purchasers of wire.

We believe that this depression which we are passing through should prove of benefit and if it teaches the lesson that price cutting is a losing game, it will be worth the cost and be the means of establishing a business basis where each manufacturer can conduct his business at a reasonable profit.

Yours very truly,

THE ATLANTIC WIRE COMPANY

Wm. E. Hotchkiss

WEH:K

President

FOR INFORMATION REGARDING
THE WIRE ASSOCIATION
SEE PAGE 385